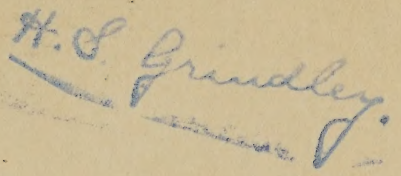
REMOTE STORAGE



Compliments of

SAMUEL G. DIXON, M. D., LL. D.

COMMISSIONER OF HEALTH,

Commonwealth of Pennsylvania.

H. S. Grindley.

614.09
P38a
1907
cop. 3

REMOTE STORAGE

SECOND ANNUAL REPORT

OF THE

COMMISSIONER OF HEALTH

OF THE

COMMONWEALTH OF PENNSYLVANIA.

THE LIBRARY OF THE
JAN 15 1931
UNIVERSITY OF ILLINOIS.

HARRISBURG, PA.:
HARRISBURG PUBLISHING CO., STATE PRINTER.
1908.

G14.09
P38a

1907
cop. 2

TABLE OF CONTENTS.

	Page.
Letter of Transmittal,	1
Second annual report of the Commissioner,	3
Completion of the organization of the Department,	3
Medical Inspection,	3
Supervision of Local Boards,	4
Vital Statistics,	4
Morbidity Statistics,	4
Marriage Statistics,	4
Registrars and Sub-Registrars,	4
Protection of water supplies,	5
Antitoxin distribution,	5
Laboratory work,	5
Appointments,	7
County Medical Inspectors,	7
Action of the Advisory Board,	7
Roster,	10
Sanitary Legislation of 1907,	15
Control of Tuberculosis,	18
Tuberculosis Sanatoria,	19
Tuberculosis Dispensaries,	20
Sewerage at Harrisburg,	22
Drinking water on railroad trains,	22
Sanitary precautions at Mt. Gretna,	23
Mortality,	23
Prevalence of Communicable Diseases,	25
Smallpox,	26
Tuberculosis,	26
Typhoid fever,	26
Scarlet fever,	26
Measles,	26
Whooping cough,	26
Diphtheria,	26
Leprosy,	27
Acute infantile paralysis,	30
Digest of Sanitary Laws of the Commonwealth,	31
Marriages,	31
Births,	31
Conferences and conventions,	36
Operations of the Divisions,	39
Division of Medical Inspection,	41
Sub-Division, Tuberculosis Dispensaries,	55
Sub-Division, Special Medical Inspection,	61
Sub-Division, School Inspection,	63
Division of Laboratories,	85
Division of Bureau of Vital Statistics,	155
Sub-Division Morbidity Statistics,	335
Sub-Division Marriage Statistics,	345
Division of Distribution of Biological Products,	353
Division of Accounts,	385
Store Room,	395
Special Reports,	399
Pennsylvania State South Mountain Sanatorium,	401

Page.

The Detection of the Bacillus Typhosus during the Scranton Epidemic of Typhoid Fever, ... 410
Epidemic of Acute Anterior Poliomyelitis, ... 420
Epidemic of Typhoid Fever at Ridgway, ... 441
Danger of fire in Formaldehyde Disinfection, ... 451
Division of Sanitary Engineering, ... 453
Organization and Administration, ... 456
Office work, ... 461
Corporation Reports, ... 461
Recorded Plans, ... 461
Petitions and Complaints, ... 461
Nuisances in Streams by industrial wastes, ... 463
Orders of abatement, ... 465
Drafting, ... 466
Engineering, ... 467
Applications for Sewage Disposal Plants, ... 467
Applications for Water Filtration Plants, ... 468
Water Works, ... 469
Water Works Permits and Decrees issued by the Commissioner, ... 469
Sewerage, ... 563
Sewerage and Sewage Disposal Permits and Decrees issued by the Commissioner, ... 563
Designs and Construction, ... 811
Preliminary Work at Pennsylvania South Mountain Sanatorium, ... 811
Sanitary Survey of Mount Gretna Park, ... 829
Railroad Water Supply, ... 861
Delaware River Statistics, ... 862
Delaware River Basin, ... 863
Schuylkill River Watershed, ... 868
Field Inspection, ... 875
Epidemics, ... 882
Scranton, Typhoid Fever, ... 882
Kittanning, Typhoid Fever, ... 900
Spangler, Typhoid Fever, ... 914
Manheim, Typhoid Fever, ... 919
East Conemaugh and Franklin, Typhoid Fever, ... 924
Ridgway, Typhoid Fever, ... 927
Burnham, Typhoid Fever, ... 937
Corry, Anthrax, ... 941
References to Special Counsel, ... 948

LETTER OF TRANSMITTAL.

Commonwealth of Pennsylvania,

Department of Health,

State Capitol, Harrisburg,

December 12, 1908.

To His Excellency, Edwin S. Stuart, Governor of Pennsylvania:

Sir: In compliance with the requirements of Section 13 of the act "Creating a Department of Health and defining its powers and duties" approved the 27th day of April, A. D. 1905, I have the honor to transmit my Second Annual Report, for the year 1907.

SAMUEL G. DIXON,

Commissioner of Health.

1—16—1907

SECOND ANNUAL REPORT

OF THE

COMMISSIONER OF HEALTH

OF THE

COMMONWEALTH OF PENNSYLVANIA

Presented by the Commissioner, SAMUEL G. DIXON, M. D.

December 12, 1908.

The opening of the year 1907 found the Department of Health fairly well organized in all its divisions, Dr. Benjamin Lee continuing to hold the position of Assistant to the Commissioner, and Mr. Wilbur Morse, that of Secretary to the Commissioner. The Divisions were, first the Division of Medical Inspection, having subsidiary general jurisdiction over the whole field of communicable diseases. All reports of epidemics and the daily reports of physicians in the rural districts of contagious and infectious diseases occurring in their practice are referred to this Division either directly or through the local Health Officers. Whenever in any locality an increased number of the ordinary communicable diseases or a single case of smallpox is reported, an inspection is made by the County Medical Inspector and appropriate measures are taken to put an end to the outbreak. A card index of all communicable diseases with places and dates of occurrence is kept in this division, and also a map marked with colored pins for ready reference. The Chief Medical Inspector since the inauguration of the Department, has been Dr. Fred C. Johnson, of Bradford, McKean county. His assistant is

Dr. Arthur B. Moulton, of Camp Hill, Cumberland county. The local working force of the Division consists of some seven hundred township Health Officers, appointed by the Commissioner and responsible only to him. Working in harmony with this force are the sixty-seven County Medical Inspectors, one in each county, and the Railroad Medical Inspectors of the three great trunk line railroads, whole duties are confined to the supervision of the properties, trains and passengers of their respective companies.

A weak place however in the practical administration of the health affairs of the State was found to be the absence or inefficiency of municipal health authorities in many first-class townships and boroughs as well as in some cities. The former relationship of the rural to the civic communities as regards sanitary regulations was beginning to be reversed. Our township health officers constantly found themselves embarrassed in the enforcement of the rules of the Department from the fact that the boroughs adjoining their districts either had no health boards or that their boards were extremely lax in the enforcement of the rules, if indeed they had formulated any regulations. In many instances, townships of the first-class had not availed themselves of the opportunity afforded by the Legislature for establishing boards of health.

In order to remedy this unfortunate condition, Dr. John A. Bouse, of Chambersburg, was appointed Special Medical Inspector, with the duty of visiting all boroughs and townships where the described defective conditions existed and impressing upon the authorities the importance of completing their organization in the interest of the public health and of complying strictly with the requirements of the law and the regulations of the Department.

Second, the Bureau of Vital Statistics, under the superintendence of Dr. Wilmer R. Batt, State Registrar, has been through its 972 local registrars and 238 sub-registrars, collecting statistics of births and deaths, in a manner which won for the Department the admiration of the Chief of the U. S. Census Bureau, and an immediate place in the list of Registration States.

The machinery of this Bureau had also been utilized for the maintenance of a Third Division, that of Morbidity Statistics, through which the Commissioner was able to keep constantly in touch with the fluctuations of the public health as affected by communicable diseases in every corner of the State.

Fourth, the Registration of Marriages has also been maintained through the same Bureau.

Fifth, the Division of Sanitary Engineering, of which F. Herbert Snow, C. E., is Chief, employs four Engineers, one Chief of Designs, one Chief Draftsman, six Draftsmen and twenty-five Sanitary In-

spectors. All applications for permits to establish or enlarge water supplies or sewerage systems are referred to this Division for investigation and report. The reports are then submitted to the Governor and the Attorney General, who together with the Commissioner of Health, have the duty of final decision. All complaints of pollution of water supplies come within its jurisdiction and it naturally acts in co-operation with the Division of Medical Inspection in the management of epidemics of typhoid fever and other water-borne diseases.

Sixth, the Division of Distribution of Antitoxins and Vaccines, under the charge of Henry W. Peirson, of Philadelphia, as Chief Clerk, was already actively engaged in the distribution of Antitoxin, through its 515 Distributors, in all the most accessible centers of population in the State. The depots are at all times kept fully stocked ready for any emergency, and the system had already justified its existence by a steady and remarkable reduction in the death rate from diphtheria.

Seventh, the Division of Laboratories and Experiment Station, established in the magnificent Pathological Laboratory Building of the University of Pennsylvania, through the generosity of the Directors of that Institution, under the management of Dr. Allen J. Smith, Director of Pathology, and Dr. Herbert Fox, Chief of the Laboratories of the Department, had already been for several months examining pathological specimens presented by physicians, while D. Rivas had been prosecuting original research work and examining samples of water. The Bacillus Typhosus in the water-supply of the city of Scranton, then in the throes of an epidemic of typhoid fever, had been isolated and the source of the outbreak definitely decided.

In addition to the routine analysis work performed at the Laboratory, original research work is being actively prosecuted at the Experiment Station at White Hall, near Bryn Mawr, Montgomery county.

To carry on the clerical work required by the Commissioner and the several divisions necessitated a force of one secretary, two bookkeepers, nineteen clerks, and nineteen stenographers, many of them frequently working until late in the night.

The active force in the field and throughout the State comprehended 700 Township Health Officers, 972 Registrars and Sub-Registrars, 515 Distributors of Antitoxin, 67 County Medical Inspectors, 135 Railroad Inspectors and 47 Engineers, Field Officers and Inspectors, besides nurses, and helpers—and other employes.

The creation of such an organization, each individual of which needed to be the subject of special investigation, within a comparatively brief period, was in itself a task of no small moment, and

indicates not only that no time has been lost, but that the Department had surveyed the field before it from a broad standpoint and endeavored to compass all the pressing sanitary needs of the State as contemplated by the then existing legislation.

Among the duties assigned to the Commissioner are those belonging to members of the Water Supply Commission, the State Quarantine Board, the Medical Council of Pennsylvania, and the Dental Council of Pennsylvania—of all which he is a statutory member and which taken collectively make a considerable demand upon his time.

One of the duties imposed upon the Commissioner, is that of "suggesting any further legislative action or precaution deemed necessary for the better protection of life and health."

The report of the Registrar of Vital Statistics placed the Department in possession of the startling fact that in the year 1906 the deaths from Tuberculosis in all its forms in Pennsylvania, reached the alarming figure of 10,652. If we accept the estimate of those who have made a special study of this subject, that for every death from consumption there are seven living consumptives, this would mean that in addition to those prematurely cut off and lost to the State, there were between 60,000 and 70,000 individuals whose productive capacity was not only either destroyed or greatly impaired, but many of whom were, also in addition, a burden to their families and friends and probably to the community.

Over against this was the fact that beyond the amounts contributed to South Mountain Sanatorium at Mont Alto, and a few private hospitals and sanatoriums, amounting altogether to $77,500.00, the State was doing nothing officially to meet this appalling condition. The Department felt that this knowledge imposed upon it a responsibility for bringing to bear for the diminution of this scourge all the resources of modern medicine on a scope commensurate with the wealth and dignity of the Commonwealth, and the magnitude of the problem.

The Republican party in the State took up the question with great seriousness, and inserted a plank in its platform pledging the party to adopt measures at the meeting of the next Legislature, to begin an efficient movement to remedy this great evil. In conference with His Excellency, Governor Stuart, the Commissioner suggested a general scheme of operations, which met the approval of the former. Bills were, therefore, prepared and presented to the Legislature early in the session of 1907, which provided for the appropriation of the sum of one million dollars for this purpose.

The first of these acts was entitled: An Act "To provide for the establishing and maintenance of one or more Sanatoria or colonies in Pennsylvania for the free care and treatment of indigent persons

suffering from Tuberculosis and making an appropriation therefor." It pledged the Department to the establishment of a Tuberculosis Dispensary in every county of the State, not only "for the free treatment of indigent persons suffering from Tuberculosis," but also "for the dissemination of knowledge relating to the prevention and cure of Tuberculosis, and for the study of social and occupational conditions that predispose to its development." It then provided that one or more Sanatoria or colonies should be established in the State for the treatment of indigent persons suffering from Tuberculosis and authorized the Department of Health with the approval of the Governor, to acquire property and erect the necessary buildings for this purpose. A third purpose contemplated by the Legislature was continuing research experiments for the establishment of possible immunity and cure of said disease. This work had already been begun by Dr. Herbert Fox, Chief of the Laboratories.

In accordance with the Legislative program, the care of the Dispensaries has been assigned to the County Medical Inspectors, and inasmuch as it was essential that these officers should be thoroughly versed in the diagnosis and modern treatment of Tuberculosis, it became necessary to make some changes in the corps. The following are the recent appointments, made on this account:

County.	Physicians.	Town.
Adams,	J. R. Dickson,	Gettysburg.
Cameron,	W. S. Falk,	Emporium.
Carbon,	J. K. Henry,	Mauch Chunk.
Chester,	Jos. Scattergood,	West Chester.
Clarion,	J. T. Rimer,	Clarion.
Crawford,	J. K. Roberts,	Meadville.
Lancaster,	J. L. Mowery,	Lancaster.
Lebanon,	J. K. Riegel,	Lebanon.
Luzerne,	C. H. Miner,	Wilkes-Barre.
McKean,	W. C. Hogan,	Bradford.
Westmoreland,	I. M. Portser,	Greensburg.
York,	J. T. Miller,	York.

The passage of the bills above referred to, at once necessitated the appointment of responsible physicians to supervise the installation and equipment of the numerous dispensaries and to assume the superintendence of the Sanatorium contemplated in the act. To fill these important positions, Dr. Thomas H. A. Stites, of Scranton, was appointed Medical Inspector of Dispensaries, and Dr. A. M. Rothrock, Resident Physician of the Pennsylvania State South Mountain Sanatorium at Mont Alto, Franklin county.

ACTION OF THE ADVISORY BOARD.

The Advisory Board held one meeting during the year, on July 25th, at the office of the Commissioner.

The personnel of the Board is unchanged. It consists therefore of Doctors Samuel T. Davis, of Lancaster; Adolph Koenig, of Pittsburg; Leonard Pearson, of Philadelphia; Charles B. Penrose, of Philadelphia; B. H. Warren, of West Chester, and Lee Masterton, C. E., of Johnstown.

At this meeting the Rules and Regulations of the Department governing the reporting of communicable diseases were amended as follows: The provision requiring all physicians practicing in townships to report immediately to the County Medical Inspectors of their respective counties was amended to require said physicians to report to the Health Officers of the townships in which the patient may be located.

It was also provided that in cities or boroughs having no sanitary authorities and in case of a known vacancy in the office of Health Officer in township, the report of such cases shall be made directly to the State Department.

In the case of such diseases occurring in hospitals situated in cities or boroughs it was ruled that the physicians or other authorities shall make report of such cases, if occurring in cities or boroughs, to the local health authorities, daily, and, if occurring outside of cities or boroughs, to the Department of Health at Harrisburg, weekly. In the case of such diseases occurring in hospitals situated in townships, the reports shall be made to the health authorities of the city or boroughs from which the cases have been received daily, but if no such health authorities exist, to the Department of Health at Harrisburg, and all cases received from the township shall be reported weekly to the State Department.

If no cases of such diseases shall have occurred in a city or borough during a calendar month, the fact shall be reported by the sanitary authority of said city or borough to the State Department at the end of such month on cards supplied for this purpose.

The diseases referred to are as follows: Actinomycosis, Anthrax, Bubonic Plague, Cerebrospinal Meningitis (Spotted Fever), Chickenpox, Cholera, Diphtheria (So-called Membraneous Croup, Diphtheritic Croup and Putrid Sore Throat should be reported as Diphtheria), Epidemic Dysentery, Erysipelas, German Measles, Glanders, Hydrophobia, Leprosy, Malarial Fever, Measles, Mumps, Pneumonia (true), Puerperal Fever, Relapsing Fever, Scarlet Fever (So-called Scarlatina and Scarlet Rash should be reported as Scarlet Fever), Smallpox, Tetanus, Trachoma, Trichiniasis, Tuberculosis (specify form), Typhoid Fever, Typhus Fever, Whoopingcough and Yellow Fever.

In reference to the period of quarantine for Scarlet Fever it was ruled that it should be 30 days from the date of onset of the disease

provided that at the end of the period the physician in charge shall certify in writing that desquamation has entirely and absolutely ceased.

A resolution was adopted expressing the opinion of the Advisory Board and the Commissioner that a person who has had the operation for vaccination faithfully performed three times, at intervals of two successive weeks without success is for the time being immune from Smallpox, and, further, that under the present law persons who have a written certificate from a reputable physician that two such attempts to vaccinate were faithfully performed and a second certificate from a physician of the State Department of Health or of a Board or Bureau of a City or Borough may be admitted to school for one year without violating the spirit of the law, the object of which is simply to prevent the spread of Smallpox.

The following regulations were also adopted:

Absolute quarantine shall be enforced in the case of the following diseases, viz: Bubonic Plague, Leprosy, Cholera, Smallpox, Typhus Fever, and Yellow Fever.

Absolute quarantine was defined to mean—first, absolute prohibition of entrance to or exit from the building or conveyance except by officers or attendants authorized by the health authorities and the placing of guards if necessary to enforce this prohibition; second, the posting of a warning placard which states the name of the disease in a conspicuous place, or places, outside of the building or conveyance; third, the prohibition of the passing out of any object or material from the quarantined house or conveyance; fourth, provision for conveying the necessaries of life, under careful restrictions, to those in quarantine.

(Note. Since these diseases with the exception of Smallpox rarely occur in this Commonwealth, when reported, special instructions will be issued by this Department governing the individual cases.)

Modified quarantine shall be enforced in the following diseases, provided that if in any case modified quarantine is violated, absolute quarantine shall at once be enforced, viz:

Epidemic Cerebrospinal Meningitis (Spotted Fever), Diphtheria, Measles, Scarlet Fever, and Relapsing Fever.

Modified quarantine was defined to mean, first, prohibition of entrance and exit as in absolute quarantine, except in the case of certain members of the family authorized by the health authorities to pass in and out under certain definite restrictions; second, the placing of a placard as before; third, isolation of patient and attendant; fourth, prohibition of the carrying out of any object or material unless the same shall have been thoroughly disinfected. Under modified quarantine the wage earner is allowed to continue work,

provided he at no time comes in contact with the patient and that he has a room entirely separated from the patient and those attending the same as provided in instructions on isolation. In permitting householders and wage earners to continue work when cases of Diphtheria, Scarlet Fever, Epidemic Cerebrospinal Meningitis (Spotted Fever) or Measles appear upon the premises, the greatest care should be taken to prevent the carrying of the infection, and such person shall not be employed in an establishment in which is conducted the production, manufacture or sale of fabrics, wearing apparel, upholstered furniture, bedding, foodstuffs, cigars, cigarettes, candy, etc. If so employed he should leave the premises after taking an antiseptic bath, and having his clothing disinfected and thereafter remain away from the premises up to the time of the recovery of the last patient and the disinfection of the household.

I desire to express my obligations to the Advisory Board for their wise counsel and for their readiness to sustain me in every measure suggested for the maintenance of the public health.

At the end of the year the organization of the Department was as follows:

Commissioner of Health, Samuel G. Dixon, M. D.

Advisory Board, Samuel T. Davis, M. D.; Adolph Koenig, M. D.; Lee Masterton, C. E.; Leonard Pearson, M. D.; Charles B. Penrose, M. D.; B. H. Warren, M. D.

Assistant to the Commissioner, Benjamin Lee, M. D.

Secretary to the Commissioner, Wilbur Morse.

Stenographers, Miss Ivy E. Huber, Miss Mary Stephen Mark.

Messenger, Edward F. Eisely.

Janitor, John B. Sample.

Medical Division, Chief Medical Inspector, Frederick C. Johnson, M. D.

Assistant to Chief Medical Inspector, Arthur B. Moulton, M. D.

Stenographers, Miss Fannie A. Houseknecht, Miss Dorothy Sterline.

Medical Inspector of Tuberculosis Dispensaries, Thomas H. A. Stites, M. D.

Stenographer, Miss Olive E. Jamison.

Resident Physician of Mont Alto Tuberculosis Sanatorium, A. M. Rothrock, M. D.

Special Medical Inspector, John A. Bouse, M. D.

The Department also employs seven hundred or more township health officers whose duties are somewhat similar to those of health officers in cities and boroughs.

COUNTY MEDICAL INSPECTORS.

County.	Inspector.	Post Office.
Adams,	G. Rice,	McSherrystown.
Allegheny,	S. M. Rinehart,	Allegheny.
Armstrong,	T. N. McKee,	Kittanning.
Beaver,	E. S. H. McCauley,	Beaver.
Bedford,	W. de La M. Hill,	Everett.
Blair,	Wm. M. Findley,	Altoona.
Bradford,	S. M. Woodburn,	Towanda.
Berks,	Israel Cleaver,	Reading.
Bucks,	James E. Groff,	Doylestown.
Butler,	H. D. Hockenberry,	West Sunbury.
Cambria,	Wm. E. Matthews,	Johnstown.
Cameron,	H. S. Falk,	Emporium.
Carbon,	John K. Henry,	Mauch Chunk.
Centre,	George F. Harris,	Bellefonte.
Chester,	Joseph Scattergood,	West Chester.
Clarion,	J. T. Rimer,	Clarion.
Clearfield,	Spencer M. Free,	DuBois.
Clinton,	R. B. Watson,	Lock Haven.
Columbia,	S. B. Arment,	Bloomsburg.
Crawford,	J. M. Cooper,	Meadville.
Cumberland,	Harvey B. Bashore,	West Fairview.
Dauphin,	Paul A. Hartman,	Harrisburg.
Delaware,	Robert S. Maison,	Chester.
Elk,	W. L. Williams,	Ridgway.
Erie,	J. W. Wright,	Erie.
Fayette,	T. H. White,	Connellsville.
Forest,	F. J. Bovard,	Tionesta.
Franklin and Fulton,	H. X. Bonbrake,	Chambersburg.
Greene,	John T. Jans,	Waynesburg.
Huntingdon,	A. B. Brumbaugh,	Huntingdon.
Indiana,	N. F. Ehrenfeld,	Indiana.
Jefferson,	W. W. Watson,	Brookville.
Juniata,	William H. Banks,	Mifflintown.
Lackawanna,	H. V. Logan,	Scranton.
Lancaster,	J. L. Mowery,	Lancaster.
Lawrence,	J. D. Moore,	New Castle.
Lehigh,	Morris F. Cawley,	Allentown.
Lebanon,	A. J. Riegel,	Lebanon.
Luzerne,	C. H. Miner,	Wilkes-Barre.
Lycoming,	Frank Seely,	Jersey Shore.
McKean,	W. C. Hogan,	Bradford.
Mercer,	P. P. Fisher,	Sharon.
Mifflin,	A. T. Hamilton,	Lewistown.
Monroe,	W. E. Gregory,	Stroudsburg.
Montgomery,	H. H. Whitcomb,	Norristown.
Montour,	Edward A. Curry,	Danville.
Northampton,	Thomas C. Zulick,	Easton.
Northumberland,	A. C. Clark,	Sunbury.
Perry,	A. R. Johnston,	New Bloomfield.
Pike,	Wm. B. Kenworthy,	Milford.
Potter,	E. H. Ashcraft,	Coudersport.
Schuylkill,	Daniel Dechert,	Schuylkill Haven.
Snyder,	F. J. Wagenseller,	Selinsgrove.
Somerset,	Charles P. Large,	Meyersdale.
Sullivan,	J. L. Christian,	Lopez.
Susquehanna,	H. B. Lathrop,	Springville.
Tioga,	S. P. Hakes,	Tioga.
Union,	C. H. Dimm,	Mifflinburg.
Venango,	J. T. Strayer,	Oil City.
Warren,	W. M. Robertson,	Warren.
Washington,	C. B. Wood,	Monongahela.
Wayne,	H. B. Ely,	Honesdale.
Westmoreland,	I. M. Portser,	Greensburg.
Wyoming,	B. E. Bidleman,	Tunkhannock.
York,	I. C. Gable,	York.

RAILROAD MEDICAL INSPECTORS.

(Commissioned by the Commissioner of Health but not paid by the State.)

PENNSYLVANIA RAILROAD COMPANY.

Dr. S. W. Latta, Chief Medical Inspector, Philadelphia; Dr. D. W. Nead, Philadelphia; Dr. I. H. Boyd, Philadelphia; Dr. E. C. Town, Philadelphia; Dr. J. L. Bower, Reading; Dr. J. L. Wright, Columbia;

Dr. W. T. Bishop, York; Dr. S. M. Crawford, Harrisburg; Dr. A. T. Poffenberger, Sunbury; Dr. C. J. Roberts, Williamsport; Dr. J. B. Lincoln, Renovo; Dr. S. A. Bonnafon, Erie; Dr. R. H. Moore, Huntingdon; Dr. H. W. Pownall, Tyrone; Dr. W. B. Diefenderfer, Altoona; Dr. C. F. Hough, Cresson; Dr. C. W. Banks, Derry; Dr. D. N. Easter, Youngwood; Dr. W. K. T. Sanm, Pittsburg; Dr. J. B. Hileman, Pitcairn; Dr. J. C. Lemmer, Oil City; Dr. W. B. Reynolds, Olean, and Dr. H. E. Westhaeffer, Monongahela City.

PHILADELPHIA AND READING RAILWAY COMPANY.

Dr. Caspar Morris, Chief Medical Inspector, 227 South Fourth street, Philadelphia; Dr. Frederick E. Brister, Philadelphia; Dr. Francis S. Ferris, Philadelphia; Dr. Norris S. McDowell, Philadelphia; Dr. Charles F. Detweiler, Reading; Dr. J. Henry Orff, Reading; Dr. Thomas F. Heebner, Pottsville; Dr. Albert F. Bronson, Tamaqua, and Dr. William R. Brothers, Harrisburg.

BALTIMORE AND OHIO RAILROAD COMPANY.

Dr. John L. Burkholder, New Castle Junction; Dr. I. D. Chaney, Connellsville; Dr. E. A. Fleetwood, Pittsburg; Dr. W. A. Funk, Pittsburg; Dr. G. R. Gaver, Pittsburg; Dr. M. H. Koehler, Connellsville; Dr. A. L. Porter, Philadelphia; Dr. W. B. Rogers, Pittsburg; Dr. D. E. Stephen, New Castle Junction; Dr. H. F. Atkinson, Connellsville; Dr. W. J. Bailey, Connellsville; Dr. E. M. Baker, Valencia; Dr. H. Baker, Connellsville; Dr. J. A. Batton, Uniontown; Dr. J. E. S. Bell, 5221 Second Ave., Pittsburg; Dr. H. J. Bell, Dawson; Dr. J. B. Black, Cristy Park; Dr. F. C. Blessing, 5442 Second Ave., Pittsburg; Dr. Robert W. Brace, 2825 Wharton street, Philadelphia; Dr. W. J. Bryson, 5424 Second Ave., Pittsburg; Dr. L. N. Burchinal, Point Marion; Dr. M. C. Cameron, 190 43d street, Pittsburg; Dr. W. H. Cameron, 190 43d street, Pittsburg; Dr. C. L. Clover, Knox; Dr. John B. Critchfield, Ralphton; Dr. Arthur E. Crow, Uniontown; Dr. C. L. Curll, 99 Hazlewood Ave., Hazlewood, Pittsburg; Dr. C. L. DeWolfe, Chicora; Dr. W. L. DeWolfe, Butler; Dr. E. L. Dickey, St. Petersburg; Dr. W. F. Donaldson, 1007 Wylie Ave., Pittsburg; Dr. E. A. Donnon, New Castle; Dr. F. H. Evans, Chester; Dr. John Foster, New Castle; Dr. W. S. Foster, 252 Shady Ave., Pittsburg; Dr. J. S. Garman, Berlin; Dr. W. A. Garman, Berlin; Dr. W. D. Haight, Johnstown; Dr. H. R. Hardtmayer, 823 Liberty street, Allegheny; Dr. James M. Hess, Marienville; Dr. Hiram Hiller, Chester; Dr. A. M. Hoover, Parker's Landing; Dr. E. O. Kane, Kane; Dr. T. L. Kane, Kane; Dr. A. M. Lichty, Elk Lick; Dr. Bruce Lichty, Meyersdale; Dr. D. C. Lindley, New Castle; Dr. A. K. Lyon, 413 North Ave., Millvale Sta., Allegheny; Dr. H. I. Marsden, Somerset; Dr. F.

L. Marsh, Mt. Pleasant; Dr. G. B. Masters, Rockwood; Dr. R. S. McKee, New Haven; Dr. W. T. Messmore, Smithfield; Dr. H. A. Miller, 219 6th street, Pittsburg; Dr. E. S. Montgomery, 219 6th street, Pittsburg; Dr. E. J. Morris, 128 South 18th street, Philadelphia; Dr. William F. Morrison, 1929 Ritner street, Philadelphia; Dr. W. S. Mountain, Confluence; Dr. W. D. O'Brien, 99 Hazlewood Ave., Hazlewood, Pittsburg; Dr. Benjamin W. Phillips, Tylersburg; Dr. R. H. Pillow, Butler; Dr. R. T. Pollard, Garrett; Dr. J. H. Price, Allison Park; Dr. S. E. Ralston, Zelienople; Dr. D. T. Rees, Hyndman; Dr. F. P. Righter, Markleton; Dr. W. F. Robeson, Westinghouse Building, Pittsburg; Dr. J. Q. Robinson, West Newton; Dr. C. C. Ross, Clarion; Dr. W. T. Rowe, Meyersdale; Dr. J. H. Shannon, Washington; Dr. W. A. Shannon, Ellwood City; Dr. J. C. Sheridan, Johnstown; Dr. M. B. Shupe, Connellsville; Dr. A. R. Shuster, Finleyville; Dr. J. N. Sprowls, Claysville; Dr. W. S. Stewart, Braddock; Dr. C. J. Styber, 865 Liberty street, Allegheny; Dr. V. F. Thomas, Evans City; Dr. B. Thompson. Landenburg; Dr. W. R. Thompson, Washington; Dr. J. N. Timmons, West Alexander; Dr. A. W. Urmson, New Castle; Dr. W. E. Walker, McKeesport; Dr. W. W. Weaver, 6105 Woodland Ave., Philadelphia; Dr. F. H. Weidmann, Confluence; Dr. T. H. White, Connellsville; Dr. C. H. Wilson, 5448 Second Ave., Glenwood; Dr. H. R. Wilson, Callery; Dr. W. M. Woodward, McKeesport; Dr. H. A. Zimmerman, Hollsopple.

CENTRAL BUREAU OF VITAL STATISTICS.

State Registrar, Wilmer R. Batt, M. D.

Chief Clerk, Herbert B. Nelson.

Clerks, Elmer W. Ehler, H. E. Fox.

Stenographers, Miss Emma R. Longenecker, Miss Lilla H. Conolly, Miss Lillian H. Shaffer, Miss Anna Magdeburg, Miss Margaret D. Prescott.

Morbidity Statistics Sub-Division, in charge of Wilmer R. Batt, M. D.

Clerks, Miss Harriet Morley, Mrs. Edith L. M. Huber, Miss Katharine Irene McCalley, Miss Martha E. McGranagan.

Marriage Statistics Sub-Division, in charge of Wilmer R. Batt, M. D.

Clerks, Miss Emilie Charters, Miss Teresa Neupert, Miss Josephine Snavely, Miss Martha Ziegler.

DIVISION OF SANITARY ENGINEERING.

Chief Engineer, F. Herbert Snow, C. E.

Principal Assistant Engineer, in charge of general office work, Walter S. Hanna.

Principal Assistant Engineer, in charge of special investigation, Charles H. Cummings.

Principal Assistant Engineer, in charge of design and construction, Thomas Fleming.

Assistant Engineer, William H. Ennis.

Engineer and Draftsman, John M. Mahon, Jr.

Chief Draftsman, James L. W. Gibbs.

Engineering Inspector, H. A. Otto.

Engineering Inspector, F. L. Gardner.

Transitmen, Chester A. Eckbert, C. R. Forbes.

Rodmen, Edgar R. Barnes, Ivan M. Glace.

Tracers, J. W. German, Jr., Max Matthes, F. M. Sourbeer, Jr.

Chief Clerk in charge of nuisance complaints, Daniel V. Ness.

Chief Clerk in charge of local health officer work, B. C. Dickinson.

Clerk, Mrs. Ellen Johnston.

Stenographers, Miss M. Irene Cuenot, Miss M. Louise Eckels, Miss Jane Gilbert, Miss M. Ethel Hurst, Miss Marie Fasey, Miss Mary E. Russel, Miss Mary K. Sourbeer.

Chief Sanitary Inspector, M. K. Ely.

Field Officers in charge, James M. Clark, David H. Coleman, John J. Considine, J. B. Nightingale, John W. Pinkham, William R. Teats.

Special Field Inspectors, Wilson W. Ritter, Daniel Zellers, Ira F. Ziegler.

Field Officers, Henry Andrews, W. R. Claypool, John W. Downes, Richard F. Einstein, Morris Z. Frederick, Howard M. Haines, Thomas Hickey, Warren S. Hood, J. Alfred Judge, H. S. Kauffman, W. F. Lerch, Chas. T. Maclay, William P. Miller, Thomas R. Nicholson, Otto F. Nickel, W. W. Reno, Roy Souder, Charles P. Skelker, H. R. Weirick.

LABORATORIES AND EXPERIMENTAL STATION.

Director of Pathology, Allen J. Smith, M. D.

Chief of the Laboratories, Herbert Fox, M. D.

Bacteriologist, Damaso Rivas.

Assistant Bacteriologist, James B. Rucker, M. D.

Assistant, Miss Lucy H. Irwin.

Stenographer, Miss Helen M. O'Donnell.

Laboratory Diener, John R. Taylor.

Animal Diener, Leon J. Harris.

DIVISION OF DISTRIBUTION OF BIOLOGICAL PRODUCTS.

Chief of Division, Henry W. Peirson.

Stenographer, Miss Lucy A. Thompson.

Clerk, Miss Mabel E. Thorn.

DIVISION OF ACCOUNTING AND PURCHASING.

Office 1900 Race Street, Philadelphia.

Accounting and Purchasing Agent, E. I. Simpson.
Bookkeepers, Miss Agnes E. Bean, Miss Mary L. Thompson.
Stenographers, Miss Minnie A. Light, Miss Mary G. Lynch.

STOREROOM.

Storekeeper, Charles Hartzell.

SANITARY LEGISLATION OF 1907.

If the Legislature of 1905 distinguished itself by the enactment of a body of legislation for the protection of the public health far in advance of any previously enacted not only in Pennsylvania, but in any State of the Union, that of 1907 maintained the high standard of intelligent appreciation of the importance of such measures set by its predecessor. Not only did it support the Department in its various plans for increasing the efficiency of the sanitary laws, but it made a wisely generous appropriation to meet the immense expenditures necessarily to be incurred, appreciating that niggardliness in providing means for the preservation of the lives and health of our people is the falsest kind of economy. In addition to providing an adequate sum for meeting the rapidly increasing expenses of the new Department for its routine work, it displayed statesmanship of a high order in recognizing the necessity for governmental aid in checking the spread of that greatest of all destroyers in this land, Tuberculosis. With the reasonable sum of $1,000,000 at its disposal for establishing free sanatoria and dispensaries for the treatment and instruction of the indigent consumptives of the State, the Department will be able to inaugurate such a system as has never before been attempted.

The details of the proposed plans will be referred to later. Other important items of sanitary legislation were:

Act No. 10, approved the 14th day of March, A. D. 1907, amending the act of the 26th day of March, A. D. 1903, so as to provide for the acquirement by the several cities of this Commonwealth by purchase or condemnation proceedings of sufficient real estate, within or without the city limits as may be necessary for present and future use upon which to erect and construct * * * garbage or incinerating furnaces, sewage disposal works or plants with the necessary filter beds, appliances, drains and sewers, and for extensions thereof.

Act No. 81, approved the 23rd day of April, A. D. 1907, amending the act of the 15th day of May, A. D. 1889 by providing for the construction of sewers without a petition of a majority of property owners and requiring a permit from the Commissioner of Health.

Act No. 101, approved the 26th day of April, A. D. 1907, providing for the licensing and regulating of slaughter-houses, shops, wagons and places where meats, poultry, fish, game and shell-fish are prepared for use as food, or stored or exposed for sale in cities of the first class in this Commonwealth, and providing penalties for any violation of any regulation governing the same.

Act No. 127, approved the 7th day of May, A. D. 1907, regulating and defining the powers and duties of the Dental Council and State Board of Dental Examiners, and providing that the Commissioner of Health shall be a member of the same.

Act No. 129, approved the 7th day of May, A. D. 1907, authorizing municipal corporations owning their own water systems * * * to acquire land to preserve water supply from contamination.

Act No. 132, approved the 7th day of May, A. D. 1907 amending the act of the 31st day of March, A. D. 1905, providing for necessary medical attention to needy persons who may be in danger of suffering from hydrophobia so as to include all persons who may apply for aid and providing that the cost of such medical attention shall be paid by the several poor districts within this Commonwealth.

Act No. 135, approved the 7th day of May, A. D. 1907, to enable local registrars of vital statistics, and their deputies to administer the oath or affirmation to undertakers.

Act No. 181, approved the 25th day of May, A. D. 1907, authorizing boroughs to erect and maintain garbage furnaces, and pass rules and regulations for the collection, care and removal of garbage and provide penalties for the violation of the same.

Act No. 186, approved the 25th day of May, A. D. 1907, requiring the thorough cleansing of the inside of cans and other vessels, used in the shipment of milk or cream on railroads.

Act No. 187, approved the 25th day of May, A. D. 1907, to protect the public health by providing for the prevention of the preparation and sale of meat and food products which are unsound, unhealthful, unwholesome and otherwise unfit for human food, defining what shall be regarded as meat and meat food products, authorizing the appointment and compensation of local meat inspectors; authorizing the State Live Stock Sanitary Board to enforce the provisions of this act, to make rules and regulations for its enforcement and to appoint agents to assist in its enforcement, and to provide penalties for the violation or perversion thereof.

Act No. 216, approved the 28th day of May, A. D. 1907, providing that whenever any head of a family or a person shall be quarantined by any authority, because of any infectious or contagious disease, and by reason of such quarantine such person becomes unable to pay the expense of maintenance and treatment of his family or himself during the period of quarantine, he shall be considered a "poor person" or a "needy and indigent poor person" within the meaning of the poor laws of this Commonwealth.

Act No. 228, approved the 29th day of May, A. D. 1907, to enable the township commissioners of townships of the first class in this Commonwealth to establish boards of health and providing for the payment of the expenses thereof by the townships.

Act No. 240, Provides for better sanitation of school rooms.

Act No. 273, approved the 1st day of June, A. D. 1907, authorizing the transfer of the control and management of the Sanatorium on the State Forestry Reservation near Mont Alto in Franklin County, from the Commissioner of Forestry to the Department of Health.

Act No. 282, approved the 1st day of June, A. D. 1907, for the protection of the public health by prohibiting the manufacture, sale, offering for sale or having in possession with intent to sell within the State, of adulterated, misbranded, poisonous or deleterious foods and confections; regulating the enforcement of provisions, therefor, providing for the protection of persons buying and selling adulterated or misbranded foods under a guaranty; and providing penalties for the violation thereof.

Act No. 292, approved the 6th day of June A. D. 1907, amending the act of the 1st day of May, A. D. 1905, by extending the territory in which burial permits shall be valid; providing for the issuance of burial permits without fees; establishing a method for securing the given names of children; making a uniform date for the returns of local registrars; providing for certain fees in cities of the first and second class to be paid by the counties and abolishing all other systems of registration of births and deaths.

THE CONTROL OF PULMONARY TUBERCULOSIS.

No more important acts were passed by the Legislature of 1907, than Act No. 157, entitled "An Act to provide for the establishing and maintenance of one or more Sanatoria or colonies, in Pennsylvania for the free care and treatment of indigent persons suffering from tuberculosis and making appropriation therefor," and Act No.

273, entitled "An Act authorizing the transfer of the control and management of the Sanatorium on the State Forestry Reservation near Mont Alto, in Franklin county, from the Commissioner of Forestry to the Department of Health."

The importance of these acts taken collectively consists not so much in the unprecedently generous appropriation which accompanied the first, great as is the opportunity which it confers for conducting a practical campaign against this most widespread and fatal of all diseases in this country, as in the recognition on the part of this popular representative body of two great facts: First, that the most promising if not the only plan of procedure in this campaign is that which includes the education of all those suffering from the disease in the methods of precaution necessary to prevent themselves form acting as centers of infection; and, second, that the only proper body to take charge of this campaign in behalf of, and in the name of, the State is the Department of Health. A careful perusal of the act for establishing the Sanatoria, including its Preamble, will show that this statement is entirely warranted. It reads as follows:

"Whereas, Tuberculosis by its widespread distribution throughout this Commonwealth is causing untold suffering and distress, is affecting the health and prosperity of our citizens, is draining the resources of individuals and causing an appalling waste of human life; and

"Whereas, Modern science has demonstrated the possibility of minimizing this disease by measures of education, sanitary supervision, isolation, and early medical treatment; and

"Whereas, The Department of Health has one physician in each of sixty-six counties of the State, and is about to authorize a sufficient number of health officers to see that the present health laws, under the rules and regulations adopted by the Department of Health, are carried out, and thereby care for those suffering from communicable diseases which are not now cared for by the hospitals of this Commonwealth; and

"Whereas, The Department, with a sufficient appropriation and its present equipment, will establish dispensaries for the free treatment of indigent persons affected with tuberculosis, for the dissemination of knowledge relating to the prevention and cure of tuberculosis, and for the study of social and occupational conditions that predispose to its development; and

"Whereas, There are always thousands of indigent people in this Commonwealth who have contracted Tuberculosis, whose homes, lodging-places, and means will not permit them to take advantage of the advice and education dispensed by the Department of Health, as outlined above; therefore,—

"Section 1. Be it enacted, &c., That one or more sanatoria or colonies be established in the State, for the reception and treatment of indigent persons affected with incipient tuberculosis, and those so far advanced with the same disease, that may be made confortable, and removed from their families and the people at large to prevent the spread of the contagion.

"For these purposes the Department of Health, with the approval of the Governor, shall be authorized to acquire property, erect buildings, equip the same, and do all things necessary to accomplish such work, for the best interest of the people of this Commonwealth, in curing and preventing tuberculosis.

"Section 2. Be it further enacted, that should the Department of Health and the Governor select one or two tracts of land, of not over five hundred acres each, within the boundaries of the State forestry reservations, that said land be set aside for such purpose.

"For the purposes specified in this act, the sum of six hundred thousand dollars, or so much thereof as may be necessary, is hereby specifically appropriated, for the two fiscal years beginning June one, one thousand nine hundred and seven.

"Approved—The 14th day of May, A. D. 1907."

The act authorizing the transfer of the control and management of the Sanatorium on the State Forestry reservation at Mont Alto, Franklin county, from the Commissioner of Forestry to the Department of Health should it be found desirable, made imperative the careful examination of that reservation in order to determine whether it possessed the essential requirements for the open air treatment of consumption. A personal cursory inspection produced so satisfactory an impression as to justify the ordering of a careful survey of the entire tract in order to obtain definite data for arriving at a conclusion. Such a survey was at once made under the immediate supervision of F. Herbert Snow, C. E., Chief Engineer of the Department. It included the geography of the area in its relation to surrounding private properties and their population, its topography showing the varying altitudes and especially determining the location of plateaus available for camps, the character of the forest growths in different sections, its water supplies, not only as regards the bacterial content and chemical character of the water and its sufficiency for drinking and domestic purposes, but also with a view to the possibility of obtaining power for the development of electricity for lighting and other purposes, the facilities for natural surface drainage and determining the lines of a thoroughly modern and adequate sewerage system including provision for purification so that the bacilli of the disease might not be carried from the Sanatorium to those at a distance, a possibility which I had recently demonstrated to be by no means purely theoretical.

Borings were also made in order to discover the character of the strata underlying the surface mold thus determining where clay approached the surface, and where it formed basins retaining water for indefinite periods. Such locations would of course have to be avoided as unfavorable for the habitations of those suffering from tuberculosis, to whom the dampness resulting from ground water has always been considered especially inimical.

This precaution on the part of the Department must not be considered as reflecting on the judgment of Dr. J. T. Rothrock, the former Forestry Commissioner, who, with commendable alacrity made use of the opportunities which his position offered for utilizing the advantages of this tract in the interest of the poor consumptives of the State.

In view of the fact that we were dealing not simply with the problem of to-day or with a limited number of patients, but that provision must be made at the outset for a large and comprehensive plant, demanding extensive improvements of a permanent character, the Department owed it both to him and to itself, that it should verify by actual scientific investigations the conclusions at which he had arrived without such aids.

The report was so far satisfactory that no hesitation was felt in adopting the Mont Alto reservation as one in which the first of the two authorized Sanatoria should be established.

As many applicants for admission were already on the waiting list arrangements were made with Adjutant General Stewart for furnishing a sufficient number of large tents to accommodate them temporarily. These were placed upon substantial floors elevated 18 inches from the surface of the ground and were available until the completion of the cottages. Up to the present time although the cold has been quite severe during the past month it has been quite possible to make the patients comfortable and the tents will continue in use through the present winter.

TUBERCULOSIS DISPENSARIES.

Important as are the provisions for the control of the spread of tuberculosis by sanatorium methods, their usefulness is necessarily limited, especially from the educational standpoint. Hence the value of the Dispensary method as suggested in the preamble to the law.

It is intended that one of these Dispensaries shall be located in each county at a point easily accessible from all parts of the county. Each dispensary is under the immediate charge and supervision of the Medical Inspector of the County. Persons desiring to avail themselves of this unusual opportunity are expected to sign an agreement promising to continue in attendance, at specified intervals, for a certain period of time, and to faithfully carry out the instructions of the physician. A careful examination is made of each case which is recorded in detail on blanks prepared for the purpose. The progress of the case is carefully noted and placed upon the record for the purpose of comparison, and the treatment is varied in accordance with the changing requirements.

In a general dispensary where diseases of all kinds are prescribed for, the physician really has not time to properly examine and follow up cases of tuberculosis and too often considers his duty accomplished if he administers an anodyne to quiet the cough. Here, on

the contrary, no time is considered wasted which is spent in obtaining a thorough knowledge of the case. Medication, as emergencies may require, while not neglected is made entirely subsidiary to a careful regulation of the diet, the taking of much rest, the avoidance of all excesses, and the adoption and maintenance of the open air treatment in the patient's own home for which the most explicit instructions are given, and which is insisted on, as a condition of continued attention. The patient is expected to familiarize himself with the printed circular of the Department in which are detailed the precautions necessary to prevent him from re-infecting himself or infecting other members of his family, or his neighbors or fellow workmen. Thus a process of education is being carried out all over the State which cannot but result in a great diminution of the disease and the saving of many lives. One great advantage accruing to the pockets as well as the health of these unfortunates consists in the abandonment of the use of quack medicines advertised as "sure cures for consumption" with which the market is flooded and the only effects of which are to temporarily soothe the cough by reason of the opium or other anodyne or the alcohol which they contain, to disorder the digestion and hasten the progress to the grave. Hundreds of thousands of dollars are wasted in this way every year in this State, which should go to procure nourishing food and home comforts for the invalid and his family. The appropriation which the State has given the Department for this item, while liberal, is by no means extravagant, and will need to be carefully husbanded.

A number of dispensaries for the treatment of this disease having been already established in this State an inquiry was made into their history and methods. This resulted in the selection of that at Wilkes-Barre as, on the whole, presenting the greatest advantages in the matter of location and methods, and it was decided to adopt it as State Tuberculosis Dispensary No. 1. As Dr. Chas. H. Miner had been in charge of this Dispensary since its initiation and possessed the necessary qualifications for inaugurating such a movement, it was considered wise to name him as County Medical Inspector for Luzerne county, thus continuing him in charge of the work.

The Wilkes-Barre Dispensary was opened July 22nd, 1907. The total number in operation at the end of the year was twenty-two. Of these one was established in July, two in October, eight in November, and eleven in December. The time has been too brief therefore to enable us to draw any deductions as to results accomplished It may be said, however, that the total number of applicants has been 435. Of this number 40 have been reported as improved, 34 as not improved, 13 as unsuitable for treatment, and 13 as having died

DEFECTIVE SEWERAGE AT THE CAPITAL OF THE STATE.

The attention of the Commissioner having been called to serious conditions existing at Harrisburg as a result of imperfect sewerage and drainage, early in September the Chief Engineer was instructed to investigate Paxton Creek, which runs back of the old city and at the foot of the hill on which a large portion of the newer city is built.

The report of that official shows that the stream, except in seasons of flood, consists of a series of pools into which and on the banks of which garbage, dead animals and rubbish of all kinds are thrown without the slightest restriction. Many houses and some districts sewer directly into the bed of the creek. In some places the flow is almost completely interrupted by the growth of grass and weeds. In this inspection the State Engineer was accompanied by the City Engineer and the President of the Common Council of Harrisburg. A full report of the inspection will be found under the head of Operations of the Division of Engineering. The conditions existing in Harrisburg are only the counterpart of those existing in many towns in the State. This case has been made the subject of special mention, however, inasmuch as Harrisburg is the capital of the State and as the capital should be the metropolis, that is to say not the largest city nor the richest city, but the standard city of the State; the city to which all other cities should look for an example in all matters of civic administration and construction. Her water supply, her system of sewage disposal, the administration of her Board of Health, should all be of such superlative excellence that all other cities of the State, be they large or be they small, should look to her as a model whenever they desire to improve their own. In one respect she already realizes this ideal. For cities having a similar source of water supply she may well point to her own water works and filtration system, which, when entirely completed in accordance with the design of the engineer who planned them, will be well worthy of imitation, having already been the means of greatly reducing the typhoid death rate of the city.

DRINKING WATER ON RAILROAD TRAINS.

During the summer a large force of inspectors was placed on the passenger railroads of the State with instructions to carefully investigate the sources of water supply at stations and yards and the

manner of its collection and storage, in order to determine whether sufficient care was being taken to ensure the purity of water supplied to passengers.

SANITARY PRECAUTIONS AT MT. GRETNA.

At the request of Adjutant General Stewart, early in the month of June, I took up the question of the proper preparation of the grounds at Mt. Gretna for occupation as a military camp from a sanitary point of view.

Under the direction of F. Herbert Snow, Chief Engineer of the Department of Health, a careful sanitary survey of the entire plot was made. Many sources of pollution of the water supplies were discovered and abated, certain sources were unqualifiedly condemned and a detailed report was submitted to the military authorities indicating further measures necessary in order to make this location thoroughly safe for permanent occupancy, among which were a completion of the modern sanitary sewage disposal plants, a filtered water supply, completion of the drainage system, and proper arrangements for the disposal of garbage.

The anxiety of the military authorities to avail themselves of all the resources of modern medical science and engineering skill in order to preserve the health of the troops, indicates that they have not failed to learn the lesson furnished by the recent success of the Japanese in their war with Russia, and I feel sure that every possible effort to prevent the pollution of earth, air, food and water in and around the encampment will continue to be made.

A complete report of this survey will be found under the Operations of the Engineering Department.

VITAL STATISTICS.

MORTALITY.

The total number of deaths occurring during the year was 115,969.

The number registered was 125,423, but 9,459 of these were stillbirths.

This constituted an increase as compared with 1906 of 1,534. The death rate however continued the same, 16.5, while the death rate for the fifteen registration States increased by 4 per cent. The death rate for males was 17.8 and for females 15.2. That of the native population was 14.3 and that of the foreign population 22.6. That of whites was 16.1 and that of blacks 28.2.

An encouraging diminution of the death rate in early life is observed which means that more children are living to adult and therefore productive life

The marked falling off in the deaths from cholera infantum and diarrhœa of childhood is mainly to be attributed to the improvement in our milk supply and greater care in the feeding of infants. More than 10,000 deaths from violence occurred, indicating the need for more stringent laws for the regulation of machinery of all kinds.

SMALLPOX.

We are fortunate in being able to report but a single death from smallpox.

TUBERCULOSIS.

The mortality from tuberculosis was 10,825, an increase of 45 over the year 1906. The efforts which the State is making to cut down these terrible figures will be referred to later. The deaths from tuberculosis of the lungs were 9,317.

It is encouraging to note a decrease in the death rate of pulmonary tuberculosis of 1.2 as compared with 1906. The number of deaths of males was 4,896, of females, 4,421, a slight increase for the males and a decided decrease for the females. Does this indicate a greater readiness on the part of females to follow the regulations laid down by health authorities?

TYPHOID FEVER.

Typhoid fever caused the death of 3,538 of our people, principally at productive ages. This was a reduction as compared with the year before of 379. The death rate per 100,000 of population was 503.

While our typhoid death rate is still so high as to bring a blush to the cheek of every thinking Pennsylvanian, it is a matter of congratulation that the returns show a reduction of 6.5 in 1907 as compared with 1906, while in contiguous States it has either risen or remained stationary.

SCARLET FEVER.

The deaths from Scarlet Fever numbered 657, an increase over 1906 of 80. The death rate showed an increase of 1. This was owing to the fact that the disease was of a more malignant type, as shown also by the reports of other States.

MEASLES.

Measles carried off 714, a decrease of more than one-half as compared with the year previous in which a great epidemic prevailed but still more than scarlet fever, a disease much more dreaded by the people.

WHOOPING COUGH.

Whoopingcough was responsible for 1,287 deaths, a decrease of 263, as compared with 1906. It will be noted that these two diseases, measles and whoopingcough, which the public and too often the medical profession are accustomed to trifle with, taken together, destroyed 2,001 lives, or more than three times as many as scarlet fever which is always and very properly taken seriously.

The number of cases of whoopingcough reported was 3,013, showing the disease to be one of extreme fatality even allowing for defective returns of cases.

DIPHTHERIA.

Diphtheria claimed 2,136 victims. This was a decrease from the figures of 1906 of 300 and a decline in the death rate of 4.6. The fact that there is a marked increase in the death rate from Diphtheria during the school months shows the influence of school life on the prevalence of this as of all communicable diseases with the exception of whoopingcough.

MORBIDITY.

PREVALENCE OF COMMUNICABLE DISEASES.

The number of cases of Communicable Diseases reported during the year 1907 was 70,864. This was a decrease as compared with the number reported for the years previous of 17,456. This is partly to be accounted for by the fact that a wave of measles spread over the whole country, including Pennsylvania, in 1906. But making all due allowances for this fact, when we take into consideration on the other hand the increase of population and the increased efficiency of our machinery for reporting, this difference still remains sufficiently striking to allow of but one interpretation, namely that our efforts to check the spread of these diseases has been attended by a measure of success scarcely to have been hoped for. It is safe to say that the diminution in cases of contagious diseases, making all allowances, amounting to more than 2 per cent. in every 100,000 persons living. The more important of these diseases were reported as follows:

	Cases.	Deaths.
Tuberculosis,	6,109	10,825
Smallpox,	62	1
Scarlet fever,	7,699	637
Typhoid fever,	20,080	3,538
Diphtheria,	10,516	2,138
Measles,	11,776	714
Whoopingcough,	3,113	1,287
Total,	70,864	21,458

While the number of deaths from tuberculosis was 10,825; it will be noticed that only 6,109 cases were reported. This astonishing discrepancy can only be accounted for by supposing that the medical profession is by no means yet fully aroused to the necessity of promptly reporting this disease. The fight against it is now fairly on and the first essential to a successful contest is the knowledge on the part of the Department of every place where the foe is lurking. Without this, all our demonstrations in the way of Sanatoria, Dispensaries, Congresses, Lectures and Exhibits will represent to a great extent time and money thrown away. The campaign will be like that of Braddock's dress parade against the Indians and will result as disastrously.

TYPHOID FEVER.

Typhoid Fever we have always with us and will continue to do so until the State laws for protecting the purity of streams are recognized by the entire population both in town and country, and more particularly by those in charge of providing drinking water to communities. At the close of the year previous this disease was prevailing to an alarming extent in the city of Scranton, and the bacteriologists of this Department had just succeeded in the very unusual achievement of actually isolating the bacillus typhosus from a sample of water obtained from one of the reservoirs of that city. A full account of this epidemic will appear later in this report. Suffice it to say that by the combined efforts of the Department the local Board of Health and the Water Company, the disease was rapidly brought under control, but not until the Lackawanna River had been polluted to such an extent that the infection was carried to the borough of Berwick, seventy miles farther down the stream—on the Susquehanna. The Department had already issued a warning to all cities and boroughs on these rivers to abstain from the

use of water drawn directly from the river, unless after taking the precaution of boiling it, but Berwick seems to have trusted to the long distance separating her from the source of pollution, and the now exploded doctrine of the self purification of streams. In the month of August an epidemic of this disease broke out in Ridgway, Elk county, resulting in 320 cases and 15 deaths. The comparatively small mortality attending this outbreak must be attributed in part to the assiduous attentions of the nurses employed by the Emergency Committee. Too much credit cannot be given to these public servants for their intelligent and devoted services. The local authorities and private citizens co-operated to the fullest extent with the officers of the Department in stamping out the disease.

The following is one of the typical incidents where an epidemic can be directly traced to a single individual as in the case of Plymouth:

The latter part of August, 1907, cases of typhoid fever began to be observed among the children of Dawson, Fayette county. Eight cases were reported by the Secretary of the Board of Health to the State Department of Health about September 15th, traced to town water partly supplied by surface springs upon a hillside which receives drainage from a collection of families higher up on a plateau. To one of these houses there came from a distant city about August 15th a case of typhoid. Water used in washing infected clothing was thrown into a sewer which emptied on the surface of the ground. As soon as these facts were discovered the Department ordered the water from these springs cut off from the town supply. Posters were put up, warning the people that the water must be boiled. These were also distributed to all houses. No cases occurred in families not using the town water. About fifty cases occurred in all in a population of 825.

The number of cases of Typhoid Fever reported in the State during the year was 20,080. The mortality in cities and large boroughs was 15.8 and in the rural districts 33.5. The failure of physicians in the country to report their cases must be in part responsible for this great discrepancy. The number of deaths was 3,538.

LEPROSY.

Leprosy is a rare affection in this country. While it is only mildly infectious, it possesses three characteristics which make it necessary that it should come under the careful supervision of the health authorities. These are, first, its long period of incubation, the disease not manifesting itself in many instances for months or even

years after the infection has taken place; second, its painful and loathesome character and protracted duration, death perhaps not coming to the sufferer's relief for from ten to twenty years from the time of its origin, and third, the fact that it is, up to the present time, incurable.

While, therefore, there is no reason for a panic when a case occasionally makes its appearance in a community, on the other hand the authorities who have given the subject the most careful thought agree that a leper at large is a menace to the health of a community. Hence, when it was brought to my notice on Friday, July 5, 1907, that a case suspected of being leprosy had been reported to the Sanitary Committee of Councils of Harrisburg (there being unfortunately no Board of Health in that city) and that he had been summarily deported to be set loose in a neighboring city, I made it my business to communicate at once with the authorities of other cities and of the State of Maryland in order that he might be arrested and returned.

He, however, returned voluntarily and on Friday, July 9, was discovered by a Harrisburg police officer in the neighboring borough of Steelton, acting as a cook in a restaurant.

He was at once taken to the Harrisburg Sanitary Hospital, where provision had been made for his reception within the grounds, two tents having been sent out and two guards secured. The house in which he was found was at once disinfected.

Physicians of the Department were immediately detailed to make an examination and to take specimens for bacteriological investigation. Following their report, I visited the patient myself, accompanied by Dr. William M. Welsh, consultant to the Municipal Hospital of Philadelphia, and satisfied myself that the patient was a leper. A portion of the specimens was retained in Harrisburg for microscopic examination by Drs. Ellenberger and Phillips, and another portion sent to Dr. Herbert Fox, Chief of the Department Laboratories at Philadelphia. In both instances the lepra bacilli were found. The following is the report of Dr. Fox:

"The subject is a Chinaman named Mock Sem, twenty-four years of age. He has resided in Harrisburg about four months, and according to his own story has been in this country seven years, having landed at Vancouver and gone from there to San Francisco by water and having lived in that city until he came here. He claims that the disease had begun to manifest itself before he left China, and that he has never before been subjected to an examination by a Health Officer. The lesions are tubercular, on the forehead, alae of the nose, and ears, and in so early a stage that I was unwilling to make a definite diagnosis, until the crucial test of the microscope had been made."

Dr. A. B. Moulton, Assistant Medical Inspector contributes the following somewhat fuller description of the case:

"The lesions present are as follows: Some nodular masses upon the face, most noticeably on the lower lip and forehead, with some thickening of both ears, also a small area showing discoloration on the posterior aspect of the lobe of the left ear. None of these lesions show evidences of anaesthesia. On the contrary they seem to be hyper-aesthetic. The mouth and throat seem to be perfectly clear and healthy though a slight mucoid discharge from the left nostril was apparent. The legs below the knees presented thick, dark, scaly patches from which large flakes of scales could be readily peeled. No anaesthesia of these parts could be determined. The body is free from lesions—the hands, however, show slight tendency to contraction. The voice is a little husky and the patient had a cough. The physical examination of the chest reveals areas of consolidation and small cavity formations in both lungs.

"Stain speciments of discharges from the nose showed the presence of tubercle bacilli, while serum from the nodules on the ears and face showed the typical lepra bacillus.

"A diagnosis of combined tuberculosis and leprosy was therefor made. Under the use of antiseptics on the legs, followed by the use of oils, the scaley masses were dislodged, a bronze discoloration remaining.

"During November and December, chills in the afternoon combined with a marked irregularity in temperature evidenced the fact that mixed infection existed. Some loss in weight was apparent although the patient has not been weighed since his confinement in the Sanitary Hospital."

A two-roomed house was built especially for him, which was amply provided with light and fresh air, and instructions have been given that at least one window must be open at all times. He is also instructed to spend several hours daily upon the porch of his shack in the steamer chair which has been provided for him in order that he may obtain as much benefit as possible from fresh air.

While the leprous condition has changed but little, the tuberculous process is making rapid inroads upon his system.

The discovery of the lepra bacilli in due time left no room for doubt as to the diagnosis. Under the care of the physician of the Department the general health of the patient has somewhat improved, notwithstanding the fact that it has been discovered that he is also suffering from tuberculosis.

Much interest in the case has been shown by physicians interested in the study of leprosy and those desiring to improve themselves in the diagnosis of diseases of the skin, and it should also be added that much kindness has been shown the patient by citizens of Harrisburg.

In this connection the following figures extracted from the Report of the U. S. Commission of Leprosy, 1902, are of interest:

Number of cases existing in the United States,	278
Males,	176
Females,	102
Cases born in the United States,	145
Cases contracting disease in the United States,	186
Of these cases those segregated at the time of the report were,	72
Their nativity was as far as ascertained—	
Scandinavian,	41
West Indian,	22

German,	12
American (U. S.),	145
English, Irish, Mexican and Chinese,	58
The number of states having lepers is	21
California has	24
Florida has	24
Louisiana has	155
Minnesota has	20
North Dakota has	16
Undetermined residence,	39
Leper colony (in Louisiana),	1
Isolation at home enforced in Minnesota and Iowa,	2
Lepers at large, 73 per cent. or	203

That there are 203 district centers of infection in the United States not subject to governmental control affords matter for thoughtful contemplation.

It will be seen that there is a lamentable laxity with regard to the control of leprosy in this country. Only one State has sufficiently appreciated the seriousness of the condition to establish a leprosarium or leper colony, and in only two are they subjected to State supervision in their homes. We have only to look at neighboring states in Central and South America and the West India Islands to be convinced of the folly of this policy of neglect. And when we consider that more than one-half of the cases reported were born in the United States and two-thirds had contracted the disease in this country, it would seem to require no argument to prove that it is the bounden duty of health authorities to keep all cases under careful surveillance when discovered in the several States until such time as the United States Government has accepted the responsibility which naturally devolves upon it, of providing a retreat for them where they shall cease to be objects of anxiety and menace to their neighbors, and be provided with the comforts of a home at the same time with all the means that medical science can suggest for the relief of their sufferings and for their cure if such can be accomplished.

EPIDEMIC OF ACUTE INFANTILE PARALYSIS.

This disease, so very unusual in epidemic form, made its appearance during the summer of 1907 in Elk, Venango and Butler counties, coincidently with an outbreak of cerebrospinal meningitis with which it was confounded by many observers. The chief of the Laboratories, Dr. Fox, was deputed to investigate its history. He obtained records of 131 cases in and around Oil City, Ridgway and

DuBois and information of from 25 to 40 more in one region of Elk county, showing a considerable distribution of the contagion. The report which will be found in full later in the volume leads one to consider whether the time has not arrived to adopt some form of hygienic control for this disease.

MARRIAGES.

The number of marriages recorded during the year was 60,243, an increase of 916 as compared with those recorded in 1906. The number of persons married per 1,000 of population living was 17.1, which is the same as that of the previous year.

BIRTHS.

The number of births exclusive of still births was 175,548, while that reported in 1906 was 167,265, an increase of 8,283. This increase is partly to be attributed to increased accuracy in reporting.

DIGEST OF SANITARY LAWS OF THE COMMONWEALTH.

One of the duties assigned to the late State Board of Health and which has been transmitted to the Commissioner is the codification of the sanitary laws of the Commonwealth. This labor has been taken up with our legal adviser. Such a mass of legislation looking to the protection and improvement of the health of the people directly or indirectly has been found scattered through the pamphlet laws and digests that it has been thought better to confine our work of systematizing the statutes to those with the enforcement of which the Department or local Boards of Health were directly concerned. We have considered that the laws relative to the health or safety of the citizens of the Commonwealth might be classified as follows:

I. Laws relating to the regulation of practitioners of the healing arts and of undertakers, the enforcement of which is entrusted to the following bodies:
   (a) The Medical Council of Pennsylvania and the Board of Medical Examiners.
   (b) The Dental Council and the State Board of Dental Examiners.
   (c) The State Pharmaceutical Examining Board.
   (d) The State Board of Veterinary Medical Examiners.
   (e) The State Board of Undertakers.

II. Laws providing for the health and safety of persons employed in certain occupations, the enforcement of which is entrusted to the following authorities:

(a) The Factory Inspector.
(b) The Bureau of Mines.

III. Laws relating to the protection of life and limb from accidents from illuminating oils, the enforcement of which is entrusted to Oil Inspectors in the several counties.

IV. Laws relating to the maintenance of quarantine at the Port of Philadelphia, the enforcement of which is entrusted to the State Board of Quarantine of Pennsylvania.

V. Laws relating to the construction of buildings and the inspection of the same, the enforcement of which is entrusted to the various municipal authorities.

VI. Laws to prevent the adulteration of food, etc., the enforcement of which is entrusted mainly to the following authorities:

(a) The Dairy and Food Commissioner.
(b) The State Live Stock Sanitary Board and State Veterinarian.

VII. Laws making certain acts prejudicial to the public health misdemeanors, the enforcement of which is entrusted to the various prosecuting attorneys.

VIII. Laws relating to the State Department of Health and to local boards of health in cities, boroughs and townships.

IX. Sanitary Laws of general application, the enforcement of which is entrusted to the Department of Health and the various local Boards of Health.

Inasmuch as neither the Department of Health nor the local boards are authorized to enforce the first seven of these classes of acts, it has not been thought wise to burden ourselves with their codification at least for the present. And indeed those relating to cities of the first and second classes are so voluminous, while at the same time they are not of general application, that it was considered allowable to omit them also. Our object has been to present in a systemized arrangement, for ready reference, such laws as will be most frequently needed by Health Officers and local boards throughout the State.

These have been thus codified:

PART I.

Laws Relating to the Department of Health of Pennsylvania.

I. The Commissioner of Health.
II The Advisory Board.

III. The General Powers of the Commissioner.
IV. Additional Powers originally conferred upon the State Board of Health.
V. Powers and Duties of the Commissioner Relative to the Purity of the Waters of the State.
VI. The Bureau of Vital Statistics.
VII. Miscellaneous Provisions relative to the Department.

PART II.

Laws Relating to Boards of Health in Cities, Boroughs and Townships.

I. Boards of Health in Cities of the First and Second Classes.

The laws relating to Boards of Health in Cities of these classes are so numerous and voluminous that the limits of this publication do not permit of the printing of the same herein.

II. Boards of Health of Cities of the Third Class.
1. Constitution of Board.
2. Officers and Fees.
3. Powers and Duties of Board.

III. Boards of Health in Boroughs.
1. Constitution of Board.
2. Powers and Duties of the Board to be the same as those of Cities of the Third Class.
3. Officers and Fees.
4. Powers and Duties of the Board.

IV. Boards of Health in Townships.
1. School Directors in Townships to act as Boards of Health.
2. To appoint Sanitary Agents.
3. Compensation of Sanitary Agent.

PART III.

Sanitary Laws of General Application.

I. Laws relative to Infectious and Contagious Diseases applicable to all Municipalities.
1. Physicians in Municipalities to report all contagious diseases to health authorities.
2. Health authorities to placard houses in which cases of said diseases may be located. May place guards on such premises.
3. Heads of families to be responsible if placards are removed.
4. Bodies of persons dying of contagious or infectious diseases to be placed in coffin or casket within certain number of hours.
5. Such bodies to be buried within certain number of hours.

6. Attendance at funerals to be strictly limited.
7. Such bodies not to be taken into church or other public building.
8. Conveyances for adult relatives and pall bearers only to be furnished by undertakers at funerals of such persons.
9. Such bodies to be conveyed only in hearse or other vehicle reserved for the conveyance of corpses.
10. Infected premises, bedding, clothing and other effects to be disinfected after death or removal of persons suffering from such diseases.
11. Children or other persons residing in houses with persons suffering from such diseases to be excluded from school for thirty days after disinfection of premises.
12. Children not presenting certificates of successful vaccination or of previous attack of smallpox to be excluded from school.
13. Health authorities must furnish school authorities necessary certificates and blanks for registration of vaccination.
14. Health authorities to furnish school authorities bulletins of persons suffering from certain contagious diseases.
15. Persons suffering from such diseases not to enter public conveyances without notification.
16. Persons suffering from such disease not to expose themselves or be exposed in public places.
17. Infected clothing, bedding or rags not to be given away until disinfected.
18. No house or room in which persons suffering from such diseases have been located to be rented without previous disinfection.
19. Health authorities to establish regulations for the isolation of persons suffering from such diseases and for disinfection of premises and effects.
20. Certain public officers not to be members or officers of boards of health.
21. Penalties for violation of any of the provisions of this act.

PART III.

Acts Relative to Indigent Sick or Injured Persons.

1. Relief of needy sick or injured persons in counties in which there is no almshouse.

2. Poor authorities in cities of Third Class to furnish relief to needy persons.

3. Poor authorities to furnish Medical attendance to persons bitten by mad dogs.

PART IV.

Sanitary Laws Relative to School and School Houses.

1. Boards of School Directors and Controllers of School Districts to provide suitable and convenient water closets.

2. Failure to comply with Act renders directors or controllers liable to removal from office.

3. Boards of school directors and controllers of school districts to cleanse outhouses periodically.

4. Provisions of said act to be carried out before State appropriations can be paid.

5. Public school buildings must be so constructed that the health, sight and comfort of all pupils may be properly protected. Plans for heating, lighting and ventilation must be submitted.

6. Direction and area of light regulated.

7. Floor space, air space and temperature regulated.

8. School directors to adopt a modern method of disinfecting school houses.

9. School buildings to be disinfected at least once in two weeks.

10. Where there are local boards of health, method of disinfection to be approved by such boards.

11. Disinfection to be effected without interfering with regular sessions.

12. School directors to set aside fund for disinfection.

13. Penalty for failure to comply with provisions of this act.

PART V.

Nuisances.

1. Public Nuisances.

2. Nuisances in cities of the third class.

Petition to Court to appoint free-holders to report on same.

3. Duties and powers of viewers so appointed.

4. Parties interested may appeal, from viewers award.

5. If owners fail to abate nuisances within sixty days, city authorities to enter and abate.

6. This act applies only to nuisances which are not such per se.

7. Regulations of Bone boiling establishments. Permission of Health authorities required.

8. Penalty for violation of the Act.

PART VI.

Prevention of Blindness in Infants.

1. Midwives or others in charge of infants within two weeks of birth to report inflammation of the eyes of such infants to Health Officers.

2. Duty of Health Officer on receipt of report.

3. Health Officers to furnish copies of this act to midwives and nurses.

4. Penalty for failure to comply.

Provisions of General Application to Prevent the Sale of Adulterated Milk.

1. Penalty for such sales.

2. Penalty for adulteration.

3. Milk wagons to be plainly marked.

4. Penalty for defective marking.

5. Adulteration defined.

6. Councils may provide regulations for milk inspection.

7. Sale of adulterated milk prohibited in cities of the second and third classes.

8. Sale of skimmed milk as pure milk prohibited.

9. Skimmed milk to be sold and marked as such.

10. Standard for pure milk established.

11. When skimmed milk shall be deemed adulterated.

12. Inspector of milk to take samples.

13. Inspectors to institute proceedings. Fines to go to Board of Health.

14. Violations of act declared misdemeanors.

CONFERENCES, CONVENTIONS AND ADDRESSES.

On the invitation of the Commissioner of Health of the State of New York, I addressed the Health Officers of that State in annual session at the city of Syracuse, Oct. 24, 1906, on "A Glance at Health Work in Pennsylvania."

By invitation of the Legislative Club of Harrisburg, on the evening of February 13, 1907, I appeared before that body in the Senate Caucus Room and made an argument against the repeal of the law which makes the presentation of a medical certificate of successful vaccination a prerequisite for attending school in the State.

On March 6, 1907, by command of the Joint Committee on Public Health and Sanitation, I addressed a public meeting of that Committee in the Hall of the House of Representatives, laying before that body my reasons for believing that the repeal of the law above referred to would work an injury to the State. Many members of the Legislature and interested citizens were present. I was supported in this effort by prominent physicians and sanitary officers from the different parts of the State.

Dr. Wilmer R. Batt, State Registrar, was deputized to attend the conference of the State and Provincial Boards of Health at Washington, D. C., May 30th and 31st, 1907, in anticipation of a discussion upon a change in the recognized regulations concerning the interstate shipment of dead bodies. After a slight discussion the further consideration of the matter was postponed until the next annual conference. It was determined at this meeting to petition the Federal Government for the establishing of a national leprosarium.

On June 5th I delivered the Oration on State Medicine, before the American Medical Association at Atlantic City, N. J. On this occasion I embraced the opportunity to announce publicly to my fellow members of the profession the commendable action of our State Legislature in making a generous provision for the care of the consumptive poor within the limits of the Commonwealth and to outline with extreme brevity the general method by which I proposed to care for this large class of unfortunates, with an especial view to checking the spread of the disease in our communities and eventually banishing it from the State.

In response to a request from the Engineers' Society of Western Pennsylvania that I should address that body on some subject relating to their profession, on June 18, 1907, in view of my inability to be present, I deputized F. Herbert Snow, C. E., Chief Engineer, to take my place. Taking for his subject, "The Administration of Pennsylvania's Laws Respecting Water Works and Sewerage," Mr. Snow briefly reviewed the history of official sanitary work in the State from the Plymouth epidemic which led to the establishment of a State Board of Health to the Butler epidemic which paved the way for the establishment of a Department of Health with stringent laws for the protection of the purity of the waters of the State, and an adequate appropriation for their enforcement, and invited the cooperation of the club in the measures proposed, which were rehearsed somewhat in detail.

On June 28th, Dr. Wilmer R. Batt, representing the Department, addressed the Harrisburg Academy of Medicine on "Some statistics concerning the mortality and morbidity of certain communicable diseases."

In the month of November I was designated by the Secretary of the Treasury of the United States as an official delegate to the Third International Sanitary Convention of the American Republics to be held in the City of Mexico on the second day of December following. My engagements, especially in view of the approaching meeting of the Legislature absolutely precluding my attendance, I contributed a paper describing the organization and work of the Department.

OPERATIONS OF THE DIVISIONS.

DIVISION OF MEDICAL INSPECTION.

FREDERICK C. JOHNSON, M. D., Chief Inspector.

THE DIVISION OF MEDICAL INSPECTION.

COMMUNICABLE DISEASES.

During the past year this Division has been concerned in the suppression of outbreaks of communicable diseases as follows:

SMALLPOX.

ADAMS COUNTY.

Three cases of smallpox occurred in Adams county during the year 1907, being the result of importation from Torreon, Mexico. From the report of Dr. George Rice, the County Medical Inspector for this Department, it appears that one Edward G. Gulden, aged 26 years, a millwright by occupation, came to his home in Mennallen township on January 19th from Mexico. He was then in the pustular stage of a severe confluent variola which terminated fatally on January 31st. The case was cared for by his father, who later contracted varioloid of a mild discrete type, evidently modified by vaccination in early life and again upon the discovery of the nature of the illness of his son. One other case occurred from this focus, being that of Mr. Dill Bream, an undertaker who had charge of the interment of Edward Gulden. It seems noteworthy to state in this connection that from authentic reports Mr. Bream at no time was within sixty feet of the corpse. Proper precautionary measures, including general vaccination, were observed by the local Board of Health of Bendersville with the result that no other cases occurred.

ALLEGHENY COUNTY.

During the year there were 16 cases of smallpox reported from Allegheny County, none of which were in the rural districts.

BRADFORD COUNTY.

A number of cases of smallpox occurred in Wells township during the year, which from the report of Dr. S. M. Woodburn, County Medical Inspector, it appears were the result of importation. During the early part of October, 1906, one Eaton arrived from North Dakota, coming by the way of Duluth and the Great Lakes and evidently contracted the disease en route or just before starting.

Later his father and brother, neither of whom had been vaccinated, contracted the disease. The mother was apparently immune by reason of a prior vaccination. Through exposure to this family and subsequent families infected, 22 cases resulted, none of whom had been previously vaccinated. While there were seven contacts directly exposed in the infected families, owing to prompt vaccination none contracted the disease. The wisdom of compulsory vaccination of school children was well demonstrated in the exposure of some 75 pupils to the Bailey case which attended school while in the eruptive stage of the disease without any resulting cases. In all 175 persons were vaccinated before the epidemic was stamped out.

CAMBRIA COUNTY.

But one case of smallpox was reported from Cambria County. This occurred at Barnesboro during the month of October.

CHESTER COUNTY.

But one case of smallpox was reported in Chester County during the year, being that of a resident of Spring City who was later apprehended in Pittsburg, found to be suffering from the disease and placed in quarantine. The premises in which the case resided at Spring City were taken in charge by the local Board of Health and no other cases occurred.

CLARION COUNTY.

Three cases of smallpox occurred in Clarion County during the year.

The first case discovered in the County appeared during the latter part of June in a resident of Leeper who was employed in Ohio and came home on account of illness incident to the initial stage of the disease. Proper precautionary measures were instituted and no further spread of the disease resulted.

The other two cases were the result of importation from the Indian Territory during the first week in August. The first case, which resided at St. Petersburg, had been infected by a relative on a visit fom Indian Territory. Later this patient visited at Shipville while in the initial stage of the disease and as a result infected two other members of the household, one of whom was apprehended in Pittsburg. The cases were properly cared for under the direction of the local Boards of Health. No further extension of the disease occurred, although another member of the household visited by the patient mentioned above was later apprehended in Pittsburg and sent to the Municipal Hospital, where he was under treatment for this disease.

CUMBERLAND COUNTY.

Four cases were reported in Cumberland county during the year 1907. These cases appeared at Bowmansdale during the first week of January, which were the result of exposure to an eruptive disease which was regarded as chicken pox, although no physician had been consulted. This case, to whom the four cases of smallpox are traceable had arrived from Steubenville, Ohio, about two weeks prior to the outbreak. Precautionary measures were promptly instituted under the direction of County Medical Inspector, H. B. Bashore and the infected premises were released from quarantine during the first week in February without any further spread of the disease.

DAUPHIN COUNTY.

But two cases of smallpox occurred in Dauphin county during the year, of which one was reported from Swatara township and the other from Harrisburg. Township premises disinfected by Dr. Paul A. Hartman, County Medical Inspector.

ERIE COUNTY.

The only cases of smallpox in Erie county during the year occurred in the city of Erie during the month of December, when three were reported.

FRANKLIN COUNTY.

But one case of smallpox is reported from Franklin county during the year. The case in question was that of a child eight months old and presented no direct history of exposure, although it was suspected in the community that the contagion was carried to the house by a woman who went there to help butcher. In the spring of 1905 there were 125 cases of smallpox in the neighborhood in which this woman resided and from the fact that many cases were secreted and the premises not disinfected, some importance is lent to the suggestion that the case had its origin in this manner.

LANCASTER COUNTY.

The only case of smallpox occurring in Lancaster county was reported from the Borough of Columbia during the month of January. The origin of the case is not clear, but it seems to have been contracted during a visit to Maryland during the Christmas holidays. The local authorities who from experience have learned both the cost of smallpox epidemics and the efficacy of vaccination in preventing its spread instituted prompt precautionary measures which prevented results from exposure to this case.

LAWRENCE COUNTY.

During the year thirteen cases of smallpox were reported from Lawrence county, four of which were in the city of New Castle and nine in Neshannock township, adjoining the city limits. The origin

of the first case is indefinite and it is also unfortunate to note that the nature of the rash which this patient presented was not recognized as smallpox until nearly one month after its origin when other cases occurred among his associates which were unmistakably smallpox. With the exception of one case, all were of a mild type of the disease, although none had ever been vaccinated. The prompt and thorough enforcement of vaccination by the State and city health authorities prevented what gave promise of being a serious outbreak. One of the persons attacked conducted a milk dairy. The delivery of milk from this place was at once stopped and the house placed under strict quarantine. The cases occurring in the township were supervised by the County Medical Inspector.

SUSQUEHANNA COUNTY.

But one case of smallpox appeared in Susquehanna county during the year and this the result of importation from Deposit, N. Y., where the disease prevailed in epidemic form. A number of other persons were exposed including four unvaccinated members of the family of the patient, all of whom were promptly vaccinated without any further extension of the disease.

WAYNE COUNTY.

One case of smallpox occurred in Wayne county during the year, the result of importation, the patient having contracted the disease in Deposit, N. Y. The case was seen by the County Medical Inspector and no further extension of the disease occurred.

TYPHOID FEVER.

ALLEGHENY COUNTY.

Aspinwall Boro. Dr. S. M. Rinehart, C. M. I. September 12 by request of the local Board of Health a visit was made to Aspinwall on account of the prevalence of typhoid fever. Aspinwall is a borough 7 miles from Allegheny on the Allegheny river, having about 2,000 population. It is built on sanitary principles, having a good water supply from an artesian well, and a good sewerage system. Until last month they have had very little typhoid fever, 6 cases occurring in January, 3 in June, and principally traceable to other localities, that is among those who were occupied during the day either in Pittsburg or Allegheny. On August 1st a case developed on Sixth street at the west end of the borough. The house in which this case occurred is on a terrace above the greater part of the borough. Twenty or thirty yards below this house and a little west of it is a spring from which many people procured their drinking water, coming from all over the neighborhood to secure water as it was clear and palatable. While no direct connection can be established between the case mentioned and the infection of the spring, it is

beyond question the source of the infection. Up to the 16th of Sept. 50 cases were reported. The milk supply used by the various families is from many sources. Eighty per cent. of the cases live within 3 or 4 squares of the spring. Samples of water from the spring have been examined and found to contain Bacillus coli.

ALLEGHENY COUNTY.

West Liberty. On Sept. 22nd visited West Liberty, where 15 cases of typhoid fever had been reported up to this date. No Board of Health is acting at this present time. Twelve out of 15 of the cases can be definitely traced to a certain spring, 3 cases occurring in the family of the man on whose property the spring is located and 3 in the home of his brother who lives in the next household. This spring has an outlet on the public highway from which many procure drinking water and from which the infection is probably spread. The examination of water showed the presence of pollution. A warning notice was posted to prevent the further use of this water.

ARMSTRONG COUNTY.

Worthington. Dr. T. N. McKee, C. M. I., Kittanning. Visited Worthington on October 31st on account of 5 cases of typhoid fever reported, no Board of Health being organized. After consulting with the President of the Borough Council and leading citizens at a special meeting a Board of Health was appointed and will be duly organized.

ARMSTRONG COUNTY.

Kittanning (See special report).

BEDFORD COUNTY.

Dr. Walter de la M. Hill, C. M. I. At Stonerstown 7 cases of typhoid fever, of which number four are certainly known to have drunk water from the same well and other three probably.

BUCKS COUNTY.

Dr. James E. Groff, C. M. I., Doylestown. On November 1st visited premises of O. R. H., where typhoid fever existed and ordered the sale of milk products discontinued.

LEHIGH COUNTY.

Dr. Morris F. Cawley, C. M. I., Allentown, Salisburg township, Jan. 29. Last Sunday inspected premises of V. R. and Mr. F., from whose premises milk was sold in Allentown and on whose milk route typhoid fever had appeared. At V. R.'s it was discovered that a child about 11 years old had just recovered from typhoid fever. Typhoid fever also existed on the premises of J. C., his next door neighbor. On the F. property it was discovered that 4 cases of

typhoid fever developed simultaneously last week. On Monday I again visited the places, giving instructions with regard to disinfection and the disposition of the milk and insisted that the necessary precautions be taken to prevent infection of the milk supply.

BERKS COUNTY.

Dr. Israel Cleaver, C. M. I. On receipt of instructions from Dr. Dixon, made inspection of farm near Shillington, about 4 miles from Reading. The first case had occurred 4 or 5 weeks from date of this visit, second case 3 weeks and third case 2 weeks from date of inspection, all of one family. We have reported 12 cases having positively originated on this farm. No history of importation can be obtained.

Water Supply: A well with pump used for culinary and drinking purposes and watering horses.

A cistern used for washing of clothing and premises only, which was condemned. Then a spring was used for several days which was next condemned and water brought by the barrel from an outside source.

All cases drank from the well. Everything around the farm is dirty and filthy.

The house was not occupied at the time of visit of C. M. I., who ordered it disinfected by the Health Officer and he also ordered a complete renovation of the entire premises. Cows were kept away from the place for a while and not allowed to use the water on the premises.

The farm is surrounded on all sides except N. E., with territory decidedly up grade, and immediately at its borders, becoming hilly, almost mountainous within a mile. In fact the farm is a flat or basin between hills except on the N. E. and here the pitch is upward towards Shillington. Good judgment therefore and skill are necessary to secure a good water supply on these premises. The family had the name of being dirty housekeepers and everything around confirmed the report.

BRADFORD COUNTY.

Dr. S. M. Woodburn C. M, I., Towanda. Athens. In accordance with instructions from Dr. Dixon, an investigation was made of the typhoid situation at Athens by Dr. Woodburn, on November 29, 1907. He found 14 cases reported to the local Board of Health from September 13th to November 26th and also learned of two other cases not reported. All these cases occurred in different parts of the town. It has been pretty positively determined that 7 of the 16 cases drank from a public well in front of the town hall, which had been under suspicion.

As one of the local physicians thought this epidemic originated in the milk supply, the Health Officer for that district was directed to examine into all sources of milk delivered into the borough of Athens.

Dr. Woodburn made the second visit to Athens on December 19th. There were 18 cases of typhoid fever found, the majority of which admitted drinking from the town pump at Athens, others from wells at Athens and Sayre, which is one mile north of Athens; in fact the two places are practically one town. No systems of sewers exists.

The town pump was thought to be the most suspicious source of the infection and next the wells in general and especially those of Sayre and of Athens contiguous to Sayre.

Nothing suspicious was found by Health Officer Hull in connection with the milk supply. Samples of water from the town pump and other wells about town were sent to the laboratory for analysis.

CAMBRIA COUNTY.

Dr. W. E. Matthews, C. M. I., Johnstown. On receipt of information from Health Officer J. W. Fouch that a number of typhoid fever cases had developed lately on the Dunlo watershed, Dr. Matthers made an investigation on October 4th of the Beaverdale, Lloydell and Dunlo watersheds.

Ten days previous to date of inspection a case of typhoid developed in Lloydell, since which time nine other cases developed. Dr. Matthews traced the source of the outbreak to a spring located 80 feet from South Fork branch of Conemaugh where, one thousand feet below, is the intake for water supply for Dunlo, Lloydell and Beaverdale. Population of these three districts, five thousand. At this point a camp was located where 250 men were constructing a new reservoir, all the filth from which camp reached this stream. Health Officer Fouch was instructed to look after sanitary condition of camp.

Samples of water were taken and the spring supposed to be polluted was thoroughly disinfected.

CRESSON.

On receipt of information that a number of cases of typhoid existed in Cresson, investigation were ordered to be made by Dr. W. E. Matthews, C. M. I., and Health Officer Dr. Lynch, of Cresson. Two cases of typhoid fever were found on the N. dairy farm in Munster township, from which milk was supplied to the borough of Cresson. Samples of milk and water from this farm were sent to the laboratory for analysis. The sanitary condition of this farm was very bad, and orders were issued to clean it up.

CHESTER COUNTY.

Dr. J. C. Mewhinney, C. M. I. Cochranville. In the latter part of February information was received by the Department that typhoid fever existed at Cochranville. The County Medical Inspector, Dr. J. C. Mewhinney, was ordered to make an investigation. Fourteen cases were found.

The source of infection was supposed to come from two springs located on private properties—there is evidence of one case, however, being the result of contagion. The conditions about the house and premises upon which these springs were located were found to be in a very filthy condition and a general cleaning up was ordered. One spring was condemned and a new spring house was built on the other property.

Samples of water were taken and sent to the laboratories for examination. All necessary instructions relative to precautions to be observed were given and no further trouble was reported.

CLEARFIELD COUNTY.

Dr. S. M. Free, C. M. I., DuBois. Woodland. Oct. 13. Investigated an outbreak of typhoid fever at Woodland, Bradford township. Six cases of typhoid fever found in 3 families. The history of one house shows that for the past 12 years there have been frequent cases of typhoid fever in it.

CLINTON COUNTY.

Dr. R. B. Watson, C. M. I., Lock Haven. Greenburr, March 8. Investigated the outbreak of typhoid fever at Greenburr which has prevailed in that vicinity since last fall. Number of cases have totalled about 30. As some of these cases had used the spring water at the camp grounds I examined the same which are about half way between Boonville and Greenburr. The creek runs by the grounds and there are 2 springs on the ground which, when the creek is high, are flooded by water from the creek. The privy used by the campers is on the bank above the springs. The cases referred to were below the camp and along the creek as far as Tylersville a distance of 7 miles. All cases can be traced either to the water of the spring of the camp or to the water below the camp.

CHESTER COUNTY.

Dr. J. C. McWhinney, C. M. I., Spring City. Llanerch. On the 16th of September I made an investigation of an outbreak of typhoid fever in Llanerch, finding that 11 cases had occurred and that all took their milk from one dairy. It has been determined that typhoid fever existed on the dairy farm in question.

COLUMBIA COUNTY.

Dr. S. B. Arment, C. M. I. Berwick. On the 11th of January, 1907, upon receipt of information that typhoid fever was prevalent to a considerable extent in the town of Berwick, an investigation was made by Dr. S. B. Arment, County Medical Inspector. His report shows the existence of 27 cases of typhoid in Berwick and 22 in West Berwick up to January 14th.

In going over the situation carefully it was found that the greater number of cases were located near the pumping station which was served by water from the Susquehanna river, and although there are a few apparently secondary cases it is thought that most are primary, due to infection of the pipes from the river supply that has been passing through them night and day since last year's epidemic and which probably became infected at that time. Now, however, the pipes are filled from the opposite direction as the water comes from the dams of the Water Company.

DAUPHIN COUNTY.

Dr. Paul A. Hartman, C. M. I. Millersburg. On October 15, 1907, Dr. Paul A. Hartman, County Medical Inspector of Dauphin county, was instructed to make an inspection at Millersburg, on account of the existence of typhoid fever at that place.

He found 4 cases in three houses within 100 yards of each other. All these cases obtained drinking water from the same well which had been examined a short time before and found to be polluted. Another case of typhoid was found, remote from these cases, which on investigation showed that there was a condemned well on the premises which was supposed not to be in use. This, however, was not the case and the party using it accordingly paid the penalty.

Recommendation was made to the local board to abandon both wells entirely which was accordingly done and ended the trouble.

DELAWARE COUNTY.

Dr. Robert S. Maison, C. M. I. Swarthmore College. The Department having received a communication from George B. Cresson, Secretary of the Board of Health of Swarthmore, relative to an outbreak of typhoid fever at that place, Dr. Robert S. Maison, County Medical Inspector, was ordered to make an investigation. His report of February 28th shows the existence of five cases in the college.

Samples of the milk and water supplies were sent to the laboratory for examination but no positive report was expected, inasmuch as it was believed the cases all developed as a result of infection of the college milk supply by the negro who was employed to take care

of the milk and was believed to have walking typhoid as he continued working at the milk although gradually getting sicker until forced to quit.

LEHIGH COUNTY.

Dr. Morris F. Cawley, C. M. I. Franklin. On June 28th an inspection was made at Franklin by Dr. Morris F. Cawley, County Medical Inspector, upon instructions from this Department on account of the report of the existence of typhoid fever at that place.

The first case was that of a woman who infected the well on her premises. Following this, 9 other cases developed who were users of this same well. It was recommended that this well be condemned and no further trouble was reported.

MONTGOMERY COUNTY.

Dr. C. H. Mann, Acting C. M. I. Bethesda Home, Chestnut Hill, Owing to the report of 13 cases of typhoid fever having been removed from the Bethesda Home to the Germantown Hospital, Philadelphia, Dr. C. H. Mann, Acting County Medical Inspector for Montgomery county, in company with our Health Officer, Dr. W. B. Jameson, made an investigation during the latter part of September, 1907.

A spring on the M——— premises, near the Bethesda Home, from which all those afflicted had drunk, was found to be the source of the infection and a placard signed by the Commissioner of Health, warning the public not to drink of this water, was placed by the spring. No further cases were reported.

MONTGOMERY COUNTY.

Dr. H. H. Whitcomb, C. M. I. Evansburg. On October 24th, 1907, information was received from the County Medical Inspector, Dr. H. H. Whitcomb, that four cases of typhoid fever existed in one family at Evansburg. Dr. Whitcomb, in company with Health Officer Dr. W. Z. Anders, made an investigation.

These cases were traced to a well on the premises and instructions were given for emptying and cleansing the same. No further spread of the disease occurred.

NORTHAMTON COUNTY.

Dr. Thomas C. Zulick, C. M. I. Martin's Creek. As reports from the Easton Hospital showed that four cases of typhoid fever were received into their wards from Martin's Creek, it was deemed advisable to make an inspection.

Dr. Thomas C. Zulick, County Medical Inspector, visited the place, according to instructions, on April 4, 1907. The cases reported were found to exist among the foreign population where the sanitary conditions are bad. A man was stationed to watch these people and report any new cases.

The source of the infection was found to be in the drinking water, which upon analysis showed the presence of Bac. coli. This was ordered disused and no further cases were reported.

WESTMORELAND COUNTY.

Dr. T. A. Klingensmith, C. M. I. Export. Eight cases of typhoid fever having been reported from Export, Pa., a mining town in Westmoreland county, Dr. T. A. Klingensmith, County Medical Inspector, was instructed to make an investigation on August 30, 1907.

The conditions about this town are extremely insanitary—in fact filthy. All the cases of typhoid were found to exist among the foreign element who worked for the Coal Company and occupy their houses. The attention of the Coal Company was called to the condition.

SCARLET FEVER.

The following are some of the cases in which the aid of the County Medical Inspectors has been sought in controlling Scarlet Fever:

ADAMS COUNTY.

Dr. G. Rice, C. M. I., McSherrystown. Tyrone township. May 18, 1907, by order of the Department the dairy farm of T. W. S., Tyrone township, was inspected on account of the existence of scarlet fever. Five cases were found, one death having occurred. The patients were isolated and sale of milk from these premises was prohibited. June 6th the premises were again visited and all the regulations of the Department having been carried out, quarantine was raised and the sale of milk resumed.

BUCKS COUNTY.

James E. Groff, C. M. I., Doylestown. Dec. 13th investigated the dairy farm of J. K., where two cases of scarlet fever had made their appearance. Provisions were made by which Mr. K., who had not been in the house since the patients had become ill, was to sleep and board outside of the infected house and was therefore allowed to continue the sale of milk from his dairy.

Visited Springfield township on account of the prevalence of scarlet fever and learned from various sources that cases of scarlet fever had occurred during the past months in this township and very few of them had been under the care of a physician at all. The school-

house had been fumigated as required by the Department. It does not appear that there had been any considerable outbreak of this disease.

BLAIR COUNTY.

Dr. Joseph D. Findley, C. M. I. Pleasant Valley. On receipt of information from T. C. Herbert, Health Officer, that scarlet fever existed in Pleasant Valley, an investigation was made by Dr. Jos. D. Findley, County Medical Inspector, on November 14, 1907.

He found two families in which children had had mild sore throat with slight rash followed by desquamation. The houses were ordered fumigated and he directed that the school which they had attended should also be thoroughly disinfected.

LAWRENCE COUNTY.

Dr. Jesse D. Moore, C. M. I., New Castle. New Bedford. Dr. Moore reports March 15, 1907, as follows, concerning scarlet fever at New Bedford.

The people of New Bedford and community have been troubled from time to time with the failure of Ohio doctors to report contagious troubles to the Pennsylvania authorities. This I have told their Board of Health and instructed them that the Ohio doctors, while practicing in this State, are under the same supervision as resident physicians. They have promised that they will see the law enforced.

The blame, at least partially so, I lay at the door of the present Board of Health of Pulaski township, in that being composed of the school directors of said township, they believe they cannot overstep the authority as given by the Board of Health to the school directors, as directors only. I have attempted and, I think, succeeded in convincing them that the powers of a Board of Health and the powers as school directors are distinct and separate, and that they now have all the power that the State of Pennsylvania, under its existing laws, can confer to control their township in regard to all contagious diseases.

LEHIGH COUNTY.

Dr. Morris F. Cawley, C. M. I. Guthsville. An inspection at the Guthsville school where children were in attendance suffering from scarlet fever. Ordered such children to be excluded from school during the proper period of exclusion. Found also a case of scarlet fever in the house of O. H. Orefield.

CLEARFIELD COUNTY.

Dr. Spencer M. Free, C. M. I. Hillsdale. August 13, investigated the scarlet fever situation at Hillsdale, Lawrence township, and found several cases, but all under good control, modified quarantine being enforced in each instance.

COLUMBIA COUNTY.

Dr. S. B. Arment, C. M. I. Beaver township. On March 30th made an investigation in Beaver township. Found they had had scarlet fever at three different houses and as the cases were mild no physician had been called and no precautions taken.

April 1st again visited Beaver township, discovered a case in another house where no physician was employed, the cases also being mild. Stopped the sale of dairy products from these farms for the present. Instructed the teachers to exclude from school all children suffering from communicable diseases.

LUZERNE COUNTY.

Dr. Chas. H. Miner, C. M. I. Glen Lyon. October 23, 1908, it was reported that an epidemic of scarlet fever had broken out at Glen Lyon and several nearby towns. The County Medical Inspector, Dr. Charles H. Miner, was at once instructed to make an investigation.

A house to house examination of the town was made in company with our Health Officer, Dr. Myers, and their report showed that 69 cases had existed in this town since June. There have probably been 20 other cases not seen by physicians and that have recovered.

The President of the Commissioners of Newport township promised to call a meeting of the Board at once and appoint a permanent Board of Health.

The schools were ordered closed and no public gatherings allowed. Schools and dwelling houses to be thoroughly disinfected.

Twenty-eight cases of scarlet fever were found to have existed in Wanamie since June, with one death.

In Breslau there were eleven cases and two deaths. A public funeral was prevented by aid of the State Constabulary, who also assisted in enforcing quarantine.

The school house was fumigated and ordered closed for two weeks.

In Lu Park—a settlement just below Wilkes-Barre—fifteen cases were found. The school was ordered closed.

It is evident that the epidemic was caused by the ignorance and carelessness of the people and neglect of the physicians to see that houses were placarded and later disinfected, early in the epidemic. The sanitary conditions of these towns is very bad.

DIPHTHERIA.

LEHIGH COUNTY.

Dr. Morris F. Cawley, C. M. I., Allentown. Orefield. Investigated outbreak of diphtheria in the family of C. P., living at Orefield. Found four cases of diphtheria in the family, one case terminating in death, no doctor having been called for the first two cases.

Breiningsville, May 1. Investigated the contagious disease at Breiningsville as ordered. The man of the house was treated for tonsilitis. Recovered with partial vocal paralysis. Two children became ill with the disease, one dying, presumably from laryngeal involvement. The other one has recovered with partial paralysis of the limbs.

Salisbury township. Visited Salisbury township on account of alleged cases of diphtheria existing which were not reported. Found cases existing in two families. The following day learned that four families had become infected from the first infected house where there is a case with no physician in attendance.

Note.—These few cases have been placed on record simply because they exemplify the constant menace to the public health which lies in neglected sore throats, failure to summon medical aid and carelessness in diagnosis.

SUB-DIVISION—TUBERCULOSIS DISPENSARIES.

THOMAS H. A. STITES, M. D., Medical Inspector of Dispensaries.

TUBERCULOSIS DISPENSARIES.

CHIEFS OF DISPENSARIES.

One in each county. In each case the County Medical Inspector.

ASSISTANT PHYSICIANS.

No assistant physicians were formally appointed previous to December 31st. In a number of dispensaries, physicians desiring to assist in the work volunteered their services and in almost every instance rendered valuable help.

NURSES.

At the larger places nurses have been employed upon salary. At the smaller places where the number of patients does not justify such an outlay, it has been found possible to secure the attendance of the nurses upon payment by the hour for services rendered. At another point will be found a list of the physicians and nurses in charge of dispensaries, Dec. 31st, 1907.

OFFICE WORK.

The office work may be divided into two sections: (a) The preliminary work; (b) The administrative—that required after establishment of the dispensaries.

The preliminary work consisted of securing information with regard to such work elsewhere and in the preparation of forms for use in recording the work of the dispensaries. A large amount of information was secured by the Commissioner himself and his assistants of the Medical Division. Dr. Charles H. Miner, of Wilkes-Barre, is entitled to especial credit for valuable aid in organiing

this Division. This information was sought from all parts of this country and from other countries. A number of the forms for use in the dispensaries were also prepared. The Commissioner of Health gave a great deal of his personal attention to this preliminary work.

Included in the preliminary work was the inspection of the work of a dispensary maintained at Wilkes-Barre by the Wyoming Valley Society for the Prevention and Treatment of Tuberculosis. After carefully reviewing the work of this establishment, it seemed expedient that the Department should acquire the plant and continue its operation as Dispensary Number 1, and on due consideration and appraisement of its property, the dispensary passed into the hands of the Department of Health and opened for work under the auspices of the Commonwealth July 22nd, 1907.

ADMINISTRATIVE WORK.

The administrative work of the division consists in superintending the distribution of supplies, reviewing reports and vouchers, and personal inspection of the various dispensaries. The Medical Inspector of Dispensaries makes frequent visits to each dispensary, his coming never being known to those in charge of the particular dispensary until his arrival. In this way the Department seeks to assure itself of the maintenance of the dispensaries in proper physical condition, and that the physicians are doing their work as required by the Department.

LOCATION OF DISPENSARIES.

ONE IN EACH COUNTY.

As this Commonwealth was a pioneer in the establishment of such a system of dispensary treatment, it was felt that progress must be made slowly and in such a way as to make some provision for the needs of all sections of the State. The Commissioner of Health therefore decided that the distribution of dispensaries most likely to meet the requirements would be to assign one station to each county, making a total of sixty-seven (67).

LOCATION WITHIN COUNTY.

The problem of selecting in each county the particular place best adapted to serve the needs of the county in question was one which in a number of instances presented serious difficulties. The points of greatest importance in each were the population of the place under consideration and its means of communication with other

parts of the county. It was felt that each dispensary must be so located as to meet the demands of as great a number as possible of those who might need its assistance. A list of dispensaries given elsewhere will show the names of the places selected.

NUMBERING OF DISPENSARIES.

For the sake of convenience it was decided that each dispensary should receive a number, and that each should be numbered in the order in which its organization was begun. The dispensary located at Wilkes-Barre, Luzerne county, having been opened under the auspices of the State some months prior to any other, is Number 1.

EQUIPMENT OF DISPENSARIES.

The equipment of so large a number of dispensaries is, of course, an extensive undertaking. In consideration of this fact and in view of the ease with which articles of furniture may become infected and serve as media for the transmission of disease from one person to another, it was felt that the furniture supplies to the dispensaries must be absolutely plain and as inexpensive as might be consistent with that durability so necessary in articles in use in public places. It is needless to say that it was also felt to be desirable to avoid any articles not absolutely required for conducting the work on hand. Therefore, the dispensaries will impress the casual observer as very plain and somewhat bare. This feature has not been carried to such an extent as to make the aspect of the rooms forbidding, but is sufficiently marked to serve as an object lesson to all who may come into them, showing the possibility of conducting a great work in comfort with but few articles of furniture. The standard equipment, which, of course, is subject to such modifications as may be necessary to meet the needs of the particular dispensary, is approximately as follows:

One dozen chairs.
One couch.
One combination filing cabinet and desk.
Two kitchen tables.
One set Fairbanks Physician's scales with measure rod.
Two examining stools—1-36″ high and 1-18″ high.
One open work steel door mat.
Two pictures each showing 3 views of State South Mountain Sanatorium.
One-half dozen crash towels.
One portable wash-stand with pitcher, basin and bucket.

One dininfecting can with supply of disinfectants—Permanganate of Potash and Formaldehyde.
One linen coat for the physician's use while in attendance at the dispensary.
Paper cuspidors.
Paper napkins and bags.
Blank forms for the purpose of keeping records.

In some places the demands of the work call for certain additional equipment, but the above is the standard and any variations are simply an adaptation to local needs.

It is expected that each dispensary will be properly disinfected at such frequent intervals as to insure the safety of those called upon to work in the rooms. Provision for janitor service is also important the Department insists that the whole plant shall be kept in an orderly and clean condition.

METHODS OF DISPENSARY.

Each patient applying for treatment at a dispensary is first called upon to sign a blank application, declaring himself too poor to pay for such treatment. After this the personal and family history so far as relates to health conditions is recorded at considerable length and the patient is given a searching physical examination. The conditions revealed by the examination are carefully recorded. The patient is then instructed as to the communicable nature of the disease and the precautions which should be taken to lessen the danger of infection to those coming in contact with him. The habits of the particular patient are reviewed and the course of life best calculated to meet the needs of the individual is laid out by the physician in charge. In certain cases where the symptoms call for immediate relief, drugs are prescribed, but the use of medicine is kept at the lowest possible limit. Patients who may be unable to supply themselves with sufficient food of a digestible and nourishing character are furnished with such quantities of milk and eggs as the physician in charge may deem advisable. In order to avoid imposition, a rule of the Department forbids any physician to issue an order for supplies until after there has been an inspection of the home surroundings of the patient and a written report made of the inspection. Wherever it is possible to make use of the services of a Bureau of Information or Associated Charities, the Department consults the records of such organizations. Every possible precaution is exercised against fraud and imposition. In many instances it has been found possible to satisfy the demands of patients who think that unless they are taking medicine nothing is being done for

them, by dispensing pure olive oil. In this way the patient can be induced to take an increased quantity of food. Upon their return visits to the dispensary all patients are weighed and the weight is recorded. Any further particulars concerning the case are also noted in the history of the patient.

Each dispensary maintains a card catalogue of its patients, also of the milk and egg supplies distributed. At the end of each month the physician in charge reports to the Department the names of the patients who have applied for treatment during that month. He is also required to submit a detailed report of the work done during the month.

List of Dispensaries.

Dist. No.	County.	Place.	Date of opening.
1	Luzerne,	Wilkes-Barre,	7-22-07
2	York,	York,	11-12-07
3	Erie,	Erie,	12-10-07
4	Cumberland,	Carlisle,	10-25-07
5	Lebanon,	Lebanon,	12-21-07
6	Chester,	West Chester,	12- 5-07
7	Centre,	Bellefonte,	11- 5-07
8	Cameron,	Emporium,	10- 5-07
9	Cambria,	Johnstown,	11-26-07
11	Franklin,	Chambersburg,	11-10-07
12	Delaware,	Chester	11-12-07
14	Blair,	Altoona,	12-10-07
15	Butler,	Butler,	11-15-07
16	Columbia,	Bloomsburg,	11- 5-07
17	Fulton,	McConnellsburg,	12-10-07
19	Pike,	Milford,	12- 6-07
24	Armstrong,	Kittanning,	11- 5-07
26	Juniata,	Mifflintown,	12-17-07
28	Montour,	Danville,	12-14-07
30	Somerset,	Meyersdale,	12- 4-07
32	Venango,	Oil City,	12-13-07
34	Forest,	Tionesta,	12-20-07

List of Physicians.

Dist. No.	Physician in Charge.	Nurses.	Days.	Hours.
1	Dr. C. H. Miner,	2, salary,	Mon. Wed. Fri.,	3-5 P. M.
2	Dr. J. S. Miller,	Salary,	Mon. Wed. Fri.,	3-5 P. M.
3	Dr. J. W. Wright,	Per hour,	Tues. Wed. Fri.,	3-5 P. M.
4	Dr. H. B. Bashore,	Per hour,	Tues. and Fri.,	12-2 P. M.
5	Dr. A. J. Riegel,	Per hour,	Wed. and Sat.,	10-12 M.
6	Dr. Jos. Scattergood,	Per hour,	Wed. and Fri.,	2-4 P. M.
7	Dr. Geo. F. Harris,	Health officer,	Wed. and Fri.,	1:30-3:30
8	Dr. H. S. Falk,	Per hour,	Tues. and Fri.,	1-4 P. M.
9	Dr. W. E. Matthews,	Per hour,	Tues. and Fri.,	2-4 P. M.
11	Dr. H. X. Bonbrake,	Health officer,	Tues. and Fri.,	2-4 P. M.
12	Dr. R. S. Maison,	Salary,	Tues. and Fri.,	2-4 P. M.
14	Dr. J. D. Findley,	Salary,	Tues. and Fri.,	2-4 P. M.
15	Dr. H. D. Hockenberry,	Per hour,	Tues. and Fri.,	2-4 P. M.
16	Dr. S. B. Arment,	Per hour,	Tues. and Fri.,	2-4 P. M.
17	Dr. J. W. Mosser,	Health officer,	Tuesday,	1-4 P. M.
19	Dr. W. B. Kenworthy,	Health officer,	Monday,	2-4 P. M.
24	Dr. T. N. McKee,	Health officer,	Mon. and Fri.,	2-4 P. M.
26	Dr. W. H. Banks,	Per hour,	Tues. and Thurs.,	2-4 P. M.
28	Dr. E. A. Curry,	Health officer,	Tues. and Fri.,	2-4 P. M.
30	Dr. C. P. Large,	Health officer,	Wednesday,	2-4 P. M.
32	Dr. J. P. Strayer,	Per hour,	Tues. and Fri.,	12:30-2
34	Dr. F. J. Bovard,	Health officer,	Saturday,	9-11 A. M.

Tabular Report of Dispensaries.

Number.	1.	2.	3.	4.	5.	6.	7.	8.	9.	11.	12.	14.	15.	16.	17.	19.	24.	26.	30.	32.	
Patients admitted,	191	58	2	24	5	4	1	7	12	8	60	18	10	.....	1	.....	16	6	1	11	435
Patients Discharged:																					
Cured,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Improved,	29	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	.....	.....	.....	.....	.....	2	.....	1	.....	40
Unimproved,	23	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	9	.....	.....	.....	34
Unsuitable,	.....	.....	.....	3	.....	.....	.....	.....	2	.....	.....	1	5	.....	.....	.....	.....	1	.....	1	13
Deaths,	8	.....	.....	3	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1	13
Return visits,	526	110	4	14	8	1	7	10	8	17	144	11	20	.....	2	.....	36	3	.....	4	925
Weight:																					
Increased,	240	28	.....	1	.....	.....	1	1	2	6	16	.....	2	.....	1	.....	.....	1	.....	.....	299
No increase,	56	27	.....	.....	.....	1	1	6	4	.....	13	11	3	.....	.....	.....	.....	.....	.....	.....	122
Loss,	43	3	.....	.....	.....	.....	.....	1	4	.....	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	60
Nurses visits,	800	157	.....	12	.....	.....	.....	3	.....	.....	106	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,078
Milk—Quarts,	8,676½	454	7	141	.....	.....	.....	.....	.....	70	722	.....	.....	.....	.....	.....	.....	18	.....	14	10,112½
Eggs—Dozens,	124½	.....	3½	.....	.....	.....	.....	.....	.....	13⅓	87	.....	.....	.....	.....	.....	.....	3	.....	.....	231⅓
Days open,	75	15	7	18	8	8	14	18	10	9	15	9	14	8	4	5	8	6	8	6	257

	Luzerne.	York.	Erie.	Cumberland.	Lebanon.	Chester.	Centre.	Cameron.	Cambria.	Franklin.	Delaware.	Blair.	Butler.	Columbia.	Fulton.	Pike.	Armstrong.	Juniata.	Somerset.	Venango.	

No reports received—No. 28, Montour, open 2 days, no patients.
No reports received—No. 34, Forest, open 1 day, no patients.

SUB-DIVISION—SPECIAL MEDICAL INSPECTION.

JOHN A. BOUSE, M. D., Special Medical Inspector.

The following is a condensed statement of special work performed during the later months of the year 1907, in visiting various counties of the Commonwealth, with a view of determining the status and efficiency of local sanitary administration throughout the State.

This work was begun in the early part of September. In the county of Cambria nineteen boroughs were visited. A report of the conditions found to exist is as follows: twelve Boards of Health were found to be active, that is to say were doing some work on sanitary lines. One Board found to be inactive, or doing no work whatever. Number of boroughs visited in which no Boards of Health existed, six.

Dauphin county, number of boroughs visited, nine: active Boards five, number of boroughs without Boards of Health, four.

Huntingdon County, number of boroughs visited, ten; active Boards four, inactive one, number of boroughs without Boards of Health, five.

Luzerne county, number of boroughs visited twenty-eight, fourteen having active Boards of Health, two inactive and twelve without Boards.

Schuylkill county, number of borough visited twenty-seven, of which eighteen were active, one inactive and eight having no Boards.

Washington county, number of boroughs visited eight. Of these one had an active Board of Health, one inactive and six were without sanitary organizations.

York county, thirty-three boroughs visited, fourteen having active Boards of Health and nineteen with no Boards in existence.

As a result of the visits to the above named counties a small number of Boards were appointed but failed to organize. This matter was taken up with the proper authorities and a request made to proceed at once with the organization. Very little opposition was met with on the part of Councils regarding the organization of Boards of Health.

Complaints were made by many Secretaries of Boards of Health visited that the physicians failed to report communicable and contagious diseases promptly. In each of these cases I instructed the secretary as to his duty to furnish the physicians proper blanks for making such reports and pointed out the law on this subject. I further discovered that many of them did not require reports to be made of all the diseases listed in this Department as reportable contagious and communicable diseases.

I found that only a few places observed proper quarantine. The period of such quarantine varied considerably. Disinfection was improperly and imperfectly performed. I instructed them on this subject and acquainted them with the rules and regulations of this Department.

Appropriations made by Councils for the maintenance of Boards of Health were found to be small and entirely inadequate to properly carry forward sanitary work. I believe that if there were a better understanding on the part of the Councils as to the needs and requirements of Boards of Health, they would receive sufficient financial assistance.

As far as could be ascertained all the boroughs visited are favorable to having active Boards of Health. In some instances great difficulty is encountered in obtaining proper persons to serve on such Boards. Many of the villages are small and contain very few eligible persons. The Secretaries are generally active and well qualified and under proper regulations should become efficient. Sufficient importance is not attached to the position of the Health Officers nor are their duties properly defined. It is suggested that Boards of Health in boroughs be supplied with Model Rules and Regulations and with manuals for the guidance of Health Officers, also with regulations regarding nuisances, as is done in the case of townships.

COMMONWEALTH OF PENNSYLVANIA.

REPORT OF THE SANITARY INSPECTION OF SCHOOLS.

FALL 1907.

REPORT OF SCHOOL INSPECTIONS, FALL, 1907.

TOTALS FOR STATE.

No. of schools inspected,	9,225
No. in which conditions were sanitary,	5,113
No. in which ventilation was poor,	896
No. in which light was poor,	76
No. in which water was poor,	323
No. in which privies were dirty,	2,217
No. in which privy vaults were full,	1,116
No. in which privy vaults were overflowing,	1,121
No. in which privy vaults were offensive,	1,814
No. in which dividing fences were needing repair,	2,451
No. in which grounds were uncleanly,	659
No. admitting unvaccinated children,	2,518
No. of unvaccinated children in attendance,	35,150

ADAMS COUNTY.

No. of schools inspected,	158
No. in which conditions were sanitary,	124
No. in which ventilation was poor,	3
No. in which light was poor,	0
No. in which water was poor,	1
No. in which privies were dirty,	21
No. in which privy vaults were full,	15
No. in which privy vaults were overflowing,	14
No. in which vaults were offensive,	16
No. in which dividing fences were needing repair,	19
No. in which grounds were uncleanly,	2
No. admitting unvaccinated children,	14
No. of unvaccinated children in attendance,	69

ALLEGHENY COUNTY.

No. of schools inspected,	148
No. in which conditions were sanitary,	95
No. in which ventilation was poor,	5
No. in which light was poor,	1
No. in which water was poor,	6
No. in which privies were dirty,	28
No. in which privy vaults were full,	5

5—16—1907

ALLEGHENY COUNTY—Continued.

No. in which privy vaults were overflowing,	7
No. in which privy vaults were offensive,	24
No. in which dividing fences were needing repair,	25
No. in which grounds were uncleanly,	10
No. admitting unvaccinated children,	37
No. of unvaccinated children in attendance,	318

ARMSTRONG COUNTY.

No. of schools inspected,	262
No. in which conditions were sanitary,	115
No. in which ventilation was poor,	8
No. in which light was poor,	3
No. in which water was poor,	9
No. in which privies were dirty,	115
No. in which privy vaults were full,	39
No. in which privy vaults were overflowing,	34
No. in which privy vaults were offensive,	102
No. in which dividing fences were needing repair,	81
No. in which grounds were uncleanly,	33
No. admitting unvaccinated children,	95
No. of unvaccinated children in attendance,	1,176

BEAVER COUNTY.

No. of schools inspected,	88
No. in which conditions were sanitary,	40
No. in which ventilation was poor,	7
No. in which light was poor,	1
No. in which water was poor,	4
No. in which privies were dirty,	40
No. in which privy vaults were full,	36
No. in which privy vaults were overflowing,	33
No. in which privy vaults were offensive,	43
No. in which dividing fences were needing repair,	36
No. in which grounds were uncleanly,	7
No. admitting unvaccinated children,	31
No. of unvaccinated children in attendance,	574

BEDFORD COUNTY.

No. of schools inspected,	201
No. in which conditions were sanitary,	92
No. in which ventilation was poor,	27
No. in which light was poor,	1
No. in which water was poor,	3
No. in which privies were dirty,	29
No. in which privy vaults were full,	18
No. in which privy vaults were overflowing,	25
No. in which privy vaults were offensive,	18
No. in which dividing fences were needing repair,	83
No. in which grounds were uncleanly,	39
No. admitting unvaccinated children,	87
No. of unvaccinated children in attendance,	2,780

BERKS COUNTY.

No. of schools inspected,	323
No. in which conditions were sanitary,	221
No. in which ventilation was poor,	30
No. in which light was poor,	3
No. in which water was poor,	8
No. in which privies were dirty,	34
No. in which privy vaults were full,	12
No. in which privy vaults were overflowing,	14
No. in which privy vaults were offensive,	27
No. in which dividing fences were needing repair,	53
No. in which grounds were uncleanly,	6
No. admitting unvaccinated children,	7
No. of unvaccinated children in attendance,	27

BLAIR COUNTY.

No. of schools inspected,	118
No. in which conditions were sanitary,	67
No. in which ventilation was poor,	8
No. in which light was poor,	1
No. in which water was poor,	4
No. in which privies were dirty,	31
No. in which privy vaults were full,	12
No. in which privy vaults were overflowing,	20
No. in which privy vaults were offensive,	30
No. in which dividing fences were needing repair,	35
No. in which grounds were uncleaned,	17
No. admitting unvaccinated children,	12
No. of unvaccinated children in attendance,	94

BRADFORD COUNTY.

No. of schools inspected,	237
No. in which conditions were sanitary,	127
No. in which ventilation was poor,	7
No. in which light was poor,	3
No. in which water was poor,	9
No. in which privies were dirty,	63
No. in which privy vaults were full,	63
No. in which privy vaults were overflowing,	31
No. in which privy vaults were offensive,	71
No. in which dividing fences were needing repair,	78
No. in which grounds were uncleanly,	26
No. admitting unvaccinated children,	38
No. of unvaccinated children in attendance,	284

BUCKS COUNTY.

No. of schools inspected,	170
No. in which conditions were sanitary,	118
No. in which ventilation was poor,	23
No. in which light was poor,	1
No. in which water was poor,	5
No. in which privies were dirty,	13

BUCKS COUNTY—Continued.

No. in which privy vaults were full,	4
No. in which privy vaults were overflowing,	7
No. in which privy vaults were offensive,	2
No. in which dividing fences were needing repair,	23
No. in which grounds were uncleanly,	0
No. admitting unvaccinated children,	34
No. of unvaccinated children in attendance,	124

BUTLER COUNTY.

No. of schools inspected,	157
No. in which conditions were sanitary,	110
No. in which ventilation was poor,	14
No. in which light was poor,	0
No. in which water was poor,	13
No. in which privies were dirty,	28
No. in which privy vaults were full,	14
No. in which privy vaults were overflowing,	17
No. in which privy vauts were offensive,	21
No. in which dividing fences were needing repair,	28
No. in which grounds were uncleanly,	11
No. admitting unvaccinated children,	64
No. of unvaccinated children in attendance,	665

CAMBRIA COUNTY.

No. of schools inspected,	204
No. in which conditions were sanitary,	88
No. in which ventilation was poor,	6
No. in which light was poor,	0
No. in which water was poor,	10
No. in which privies were dirty,	17
No. in which privy vaults were full,	45
No. in which privy vaults were overflowing,	52
No. in which privy vaults were offensive,	65
No. in which dividing fences were needing repair,	70
No. in which grounds were uncleanly,	35
No. admitting unvaccinated children,	84
No. of unvaccinated children in attendance,	1,615

CAMERON COUNTY.

No schools inspections were made in this county.

CARBON COUNTY.

No. of schools inspected,	65
No. in which conditions were sanitary,	46
No. in which ventilation was poor,	3
No. in which light was poor,	1
No. in which water was poor,	2
No. in which privies were dirty,	12
No. in which privy vaults were full,	7
No. in which privy vaults were overflowing,	6
No. in which privy vaults were offensive,	11

CARBON COUNTY—Continued.

No. in which dividing fences were needing repair,	12
No. in which grounds were uncleanly,	3
No. admitting unvaccinated children,	5
No. of unvaccinated children in attendance,	45

CENTRE COUNTY.

No. of schools inspected,	207
No. in which conditions were sanitary,	99
No. in which ventilation was poor,	60
No. in which light was poor,	6
No. in which water was poor,	1
No. in which privies were dirty,	45
No. in which privy vaults were full,	32
No. in which privy vaults were overflowing,	27
No. in which privy vaults were offensive,	44
No. in which dividing fences were needing repair,	68
No. in which grounds were uncleanly,	30
No. admitting unvaccinated children,	94
No. of unvaccinated children in attendance,	1,683

CHESTER COUNTY.

No. of schools inspected,	148
No. in which conditions were sanitary,	94
No. in which ventilation was poor,	20
No. in which light was poor,	0
No. in which water was poor,	11
No. in which privies were dirty,	35
No. in which privy vaults were full,	14
No. in which privies were dirty,	35
No. in which private vaults were offensive,	25
No. in which dividing fences were needing repair,	21
No. in which grounds were uncleanly,	4
No. admitting unvaccinated children,	41
No. of unvaccinated children in attendance,	561

CLARION COUNTY.

No. of schools inspected,	78
No. in which conditions were sanitary,	41
No. in which ventilation was poor,	11
No. in which light was poor,	2
No. in which water was poor,	1
No. in which privies were dirty,	11
No. in which privy vaults were full,	5
No. in which privy vaults were overflowing,	5
No. in which privy vaults were offensive,	6
No. in which dividing fences were needing repair,	14
No. in which grounds were uncleanly,	11
No. admitting unvaccinated children,	18
No. unvaccinated children in attendance,	208

CLEARFIELD COUNTY.

No. of schools inspected,	201
No. in which conditions were sanitary,	93
No. in which ventilation was poor,	45
No. in which light was poor,	3
No. in which water was poor,	11
No. in which privies were dirty,	67
No. in which privy vaults were full,	33
No. in which privy vaults were overflowing,	21
No. in which privy vaults were offensive,	57
No. in which dividing fences were needing repair,	67
No. in which grounds were uncleanly,	40
No. admitting unvaccinated children,	36
No. of unvaccinated children in attendance,	741

CLINTON COUNTY.

No. of schools inspected,	20
No. in which conditions were sanitary,	12
No. in which ventilation was poor,	0
No. in which light was poor,	0
No. in which privies were dirty,	4
No. in which vaults were full,	2
No. in which privy vaults were overflowing,	3
No. in which privy vaults were offensive,	3
No. in which dividing fences were needing repair,	6
No. in which grounds were uncleanly,	2
No. admitting unvaccinated children,	5
No. of unvaccinated children in attendance,	18

COLUMBIA COUNTY.

No. if schools inspected,	137
No. in which conditions were sanitary,	85
No. in which ventilation was poor,	6
No. in which light was poor,	0
No. in which water was poor,	7
No. in which privies were dirty,	28
No. in which privy vaults were full,	9
No. in which privy vaults were overflowing,	8
No. in which privy vaults were offensive,	22
No. in which dividing fences were needing repair,	36
No. in which grounds were uncleanly,	2
No. admitting unvaccinated children,	42
No. of unvaccinated children in attendance,	237

CRAWFORD COUNTY.

No. of schools inspected,	292
No. in which conditions were sanitary,	120
No. in which ventilation was poor,	39
No. in which light was poor,	1
No. in which water was poor,	12
No. in which privies were dirty,	98
No. in which privy vaults were full,	26

CRAWFORD COUNTY—Continued.

No. in which privy vaults were overflowing,	34
No. in which privy vaults were offensive,	75
No. in which dividing fences were needing repair,	110
No. in which grounds were uncleanly,	12
No. admitting unvaccinated children,	223
No. of unvaccinated children in attendance,	2,510

CUMBERLAND COUNTY.

No. of schools inspected,	181
No. in which conditions were sanitary,	105
No. in which ventilation was poor,	28
No. in which light was poor,	5
No. in which water was poor,	4
No. in which privies were dirty,	38
No. in which privy vaults were full,	27
No. in which privy vaults were overflowing,	22
No. in which privy vaults were offensive,	35
No. in which dividing fences were needing repair,	18
No. in which grounds were uncleanly,	12
No. admitting unvaccinated children,	50
No. of unvaccinated children in attendance,	461

DAUPHIN COUNTY.

No. of schools inspected,	168
No. in which conditions were sanitary,	133
No. in which ventilation was poor,	4
No. in which light was poor,	1
No. in which water was poor,	1
No. in which privies were dirty,	18
No. in which privy vaults were full,	6
No. in which privy vaults were overflowing,	5
No. in which privy vaults were offensive,	7
No. in which dividing fences were needing repair,	16
No. in which grounds were uncleanly,	1
No. admitted unvaccinated children,	9
No. of unvaccinated children in attendance,	34

DELAWARE COUNTY.

No. of schools inspected,	66
No. in which conditions were sanitary,	56
No. in which ventilation was poor,	5
No. in which light was poor,	0
No. in which water was poor,	6
No. in which privies were dirty,	4
No. in which privy vaults were full,	5
No. in which privy vaults were overflowing,	2
No. in which privy vaults were offensive,	1
No. in which dividing fences were needing repair,	3
No. in which grounds were uncleanly,	1
No. admitting unvaccinated children,	10
No. of unvaccinated children in attendance,	45

ELK COUNTY.

No. of schools inspected,	75
No. in which conditions were sanitary,	36
No. in which ventilation was poor,	1
No. in which light was poor,	1
No. in which water was poor,	1
No. in which privies were dirty,	28
No. in which privy vaults were full,	7
No. in which privy vaults were overflowing,	4
No. in which privy vaults were offensive,	26
No. in which dividing fences were needing repair,	10
No. in which grounds were uncleanly,	2
No. admitting unvaccinated children,	7
No. of unvaccinated children in attendance,	105

ERIE COUNTY.

No. of schools inspected,	175
No. in which conditions were sanitary,	93
No. in which ventilation was poor,	0
No. in which light was poor,	0
No. in which privies were dirty,	10
No. in which vaults were full,	21
No. in which vaults were overflowing,	8
No. in which privy vaults were offensive,	20
No. in which dividing fences were needing repair,	29
No. in which grounds were uncleanly,	1
No. admitting unvaccinated children,	51
No. of unvaccinated children in attendance,	816

FAYETTE COUNTY.

No. of schools inspected,	219
No. in which conditions were sanitary,	112
No. in which ventilation was poor,	8
No. in which light was poor,	1
No. in which water was poor,	15
No. in which privies were dirty,	57
No. in which privy vaults were full,	19
No. in which privy vaults were overflowing,	50
No. in which privy vaults were offensive,	39
No. in which dividing fences were needing repair,	86
No. in which grounds were uncleanly,	14
No. admitting unvaccinated children,	98
No. of unvaccinated children in attendance,	1,971

FOREST COUNTY.

No. of schools inspected,	50
No. in which conditions were sanitary,	20
No. in which ventilation was poor,	4
No. in which light was poor,	0
No. in which water was poor,	0
No. in which privies were dirty,	17
No. in which privy vaults were full,	15

FOREST COUNTY—Continued.

No. in which privy vaults were overflowing,	8
No. in which privy vaults were offensive,	15
No. in which dividing fences were needing repair,	27
No. in which grounds were uncleanly,	6
No. admitting unvaccinated children,	7
No. of unvaccinated children in attendance,	38

FRANKLIN COUNTY.

No. of schools inspected,	119
No. in which conditions were sanitary,	133
No. in which ventilation was poor,	13
No. in which light was poor,	2
No. in which water was poor,	5
No. in which privies were dirty,	39
No. in which privy vaults were full,	6
No. in which privy vaults were overflowing,	6
No. in which privy vaults were offensive,	16
No. in which dividing fences were needing repair,	32
No. in which grounds were uncleanly,	3
No. admitting unvaccinated children,	113
No. of unvaccinated children in attendance,	1,846

FULTON COUNTY.

No. of schools inspected,	76
No. in which conditions were sanitary,	41
No. in which ventilation was poor,	21
No. in which light was poor,	0
No. in which water was poor,	5
No. in which privies were dirty,	17
No. in which privy vaults were full,	13
No. in which privy vaults were overflowing,	12
No. in which privy vaults were offensive,	12
No. in which dividing fences were needing repair,	20
No. in which grounds were uncleanly,	1
No. admitting unvaccinated children,	25
No. of unvaccinated children in attendance,	192

GREENE COUNTY.

No. of schools inspected,	40
No. in which conditions were sanitary,	16
No. in which ventilation was poor,	6
No. in which light was poor,	1
No. in which water was poor,	1
No. in which privies were dirty,	21
No. in which privy vaults were full,	2
No. in which privy vaults were overflowing,	7
No. in which privy vaults were offensive,	11
No. in which dividing fences were needing repair,	20
No. in which grounds were uncleanly,	13
No. admitting unvaccinated children,	39
No. of unvaccinated children in attendance,	597

HUNTINGDON COUNTY.

No. of schools inspected,	126
No. in which conditions were sanitary,	62
No. in which ventilation was poor,	23
No. in which light was poor,	2
No. in which water was poor,	5
No. in which privies were dirty,	15
No. in which privy vaults were full,	9
No. in which privy vaults were overflowing,	4
No. in which privy vaults were offensive,	7
No. in which dividing fences were needing repair,	30
No. in which grounds were uncleanly,	6
No. admitting unvaccinated children,	41
No. of unvaccinated children in attendance,	427

INDIANA COUNTY.

No. of schools inspected,	160
No. in which conditions were sanitary,	50
No. in which ventilation was poor,	8
No. in which light was poor,	1
No. in which water was poor,	12
No. in which privies were dirty,	73
No. in which privy vaults were full,	31
No. in which privy vaults were overflowing,	45
No. in which privy vaults were offensive,	48
No. in which dividing fences were needing repair,	81
No. in which grounds were uncleanly,	22
No. admitting unvaccinated children,	32
No. of unvaccinated children in attendance,	256

JEFFERSON COUNTY.

No. of schools inspected,	36
No. in which conditions were sanitary,	10
No. in which ventilation was poor,	0
No. in which light was poor,	0
No. in which water was poor,	0
No. in which privies were dirty,	17
No. in which privy vaults were full,	14
No. in which privy vaults were overflowing,	14
No. in which privy vaults were offensive,	16
No. in which dividing fences were needing repair,	21
No. in which grounds were uncleanly,	6
No. admitting unvaccinated children,	0
No. of unvaccinated children in attendance,	0

JUNIATA COUNTY.

No. of schools inspected,	83
No. in which conditions were sanitary,	46
No. in which ventilation was poor,	2
No. in which light was poor,	0
No. in which water was poor,	2
No. in which privies were dirty,	28
No. in which privy vaults were full,	14

JUNIATA COUNTY—Continued.

No. in which privy vaults were overflowing,	5
No. in which privy vaults were offensive,	28
No. in which dividing fences were needing repair,	16
No. in which grounds were uncleanly,	5
No. admitting unvaccinated children,	20
No. of unvaccinated children in attendance,	1,263

LACKAWANNA COUNTY.

No school inspections made in this county.

LANCASTER COUNTY.

No. of schools inspected,	401
No. in which conditions were sanitary,	203
No. in which ventilation was poor,	64
No. in which light was poor,	1
No. in which water was poor,	5
No. in which privies were dirty,	84
No. in which privy vaults were full,	58
No. in which privy vaults were overflowing,	60
No. in which privy vaults were offensive,	81
No. in which dividing fences were needing repair,	62
No. in which grounds were uncleanly,	10
No. admitting vaccinated children,	75
No. of unvaccinated children in attendance,	372

LAWRENCE COUNTY.

No. of schools inspected,	141
No. in which conditions were sanitary,	68
No. in which ventilation was poor,	6
No. in which light was poor,	0
No. in which water was poor,	11
No. in which privies were dirty,	40
No. in which privy vaults were full,	19
No. in which privy vaults were overflowing,	15
No. in which privy vaults were offensive,	36
No. in which dividing fences were needing repair,	31
No. in which grounds were uncleanly,	12
No. admitting unvaccinated children,	25
No. of unvaccinated children in attendance,	248

LEBANON COUNTY.

No. of schools inspected,	212
No. in which conditions were sanitary,	169
No. in which ventilation was poor,	4
No. in which light was poor,	0
No. in which water was poor,	2
No. in which privies were dirty,	21
No. in which privy vaults were full,	4
No. in which privy vaults were overflowing,	5
No. in which privy vaults were offensive,	9

LEBANON COUNTY—Contiued.

No. in which dividing fences were needing repair,	20
No. in which grounds were uncleanly,	10
No. admitting unvaccinated children,	74
No. of unvaccinated children in attendance,	1,051

LEHIGH COUNTY.

No. of schools inspected,	161
No. in which conditions were sanitary,	118
No. in which ventilation was poor,	2
No. in which light was poor,	0
No. in which water was poor,	4
No. in which privies were dirty,	25
No. in which privy vaults were full,	20
No. in which privy vaults were overflowing,	20
No. in which privy vaults were offensive,	33
No. in which dividing fences were needing repair,	15
No. in which grounds were uncleanly,	3
No. admitting unvaccinated children,	8
No. of unvaccinated children in attendance,	35

LUZERNE COUNTY.

No. of schools inspected,	189
No. in which conditions were sanitary,	101
No. in which ventilation was poor,	14
No. in which light was poor,	1
No. in which water was poor,	3
No. in which privies were dirty,	45
No. in which privy vaults were full,	17
No. in which privy vaults were overflowing,	22
No. in which privy vaults were offensive,	22
No. in which dividing fences were needing repair,	68
No. in which grounds were uncleanly,	15
No. admitting unvaccinated children,	29
No. of unvaccinated children in attendance,	490

LYCOMING COUNTY.

No. of schools inspected,	245
No. in which conditions were santitary,	156
No. in which ventilation was poor,	39
No. in which light was poor,	3
No. in which water was poor,	11
No. in which privies were dirty,	63
No. in which privy vaults were full,	53
No. in which privy vaults were overflowing,	43
No. in which privy vaults were offensive,	62
No. in which dividing fences were needing repair,	61
No. in which grounds were uncleanly,	14
No. admitting unvaccinated children,	103
No. of unvaccinated children in attendance,	889

McKEAN COUNTY.

No. of schools inspected,	103
No. in which conditions were sanitary,	36
No. in which ventilation was poor,	15
No. in which light was poor,	3
No. in which water was poor,	1
No. in which prvies were dirty,	24
No. in which privy vaults were full,	24
No. in which privy vaults were overflowing,	15
No. in which privy vaults were offensive,	32
No. in which dividing fences were needing repair,	54
No. in which grounds were uncleanly,	8
No. admitting unvaccinated children,	10
No. of unvaccinated children in attendance,	99

MERCER COUNTY.

No. of schools inspected,	196
No. in which conditions were sanitary,	110
No. in which ventilation was poor,	18
No. in which light was poor,	0
No. in which water was poor,	19
No. in which privies were dirty,	67
No. in which privy vaults were full,	44
No. in which privy vaults were overflowing,	33
No. in which privy vaults were offensive,	52
No. in which dividing fences were needing repair,	54
No. in which grounds were uncleanly,	23
No. admitting unvaccinated children,	35
No. of unvaccinated children in attendance,	565

MIFFLIN COUNTY.

No. of schools inspected,	29
No. in which conditions were sanitary,	16
No. in which ventilation was poor,	0
No. in which light was poor,	0
No. in which water was poor,	0
No. in which privies were dirty,	1
No. in which privy vaults were full,	2
No. in which privy vaults were overflowing,	1
No. in which privy vaults were offensive,	3
No. in dividing fences were needing repair,	8
No. in which grounds were uncleanly,	1
No. admitting unvaccinated children,	7
No. of unvaccinated children in attendance,	24

MONROE COUNTY.

No. of schools inspected,	80
No. in which conditions were sanitary,	28
No. in which ventilation was poor,	3
No. in which light was poor,	2
No. in which water was poor,	1
No. in which privies were dirty,	34

MONROE COUNTY—Continued.

No. in which privy vaults were full,	10
No. in which privy vaults were overflowing,	10
No. in which privy vaults were offensive,	35
No. in which dividing fences were needing repair,	31
No. in which grounds were uncleanly,	8
No. admitting unvaccinated children,	14
No. of unvaccinated children in attendance,	61

MONTGOMERY COUNTY.

No. of schools inspected,	142
No. in which conditions were sanitary,	78
No. in which ventilation was poor,	7
No. in which light was poor,	0
No. in which water was poor,	6
No. in which privies were dirty,	34
No. in which privy vaults were full,	29
No. in which privy vaults were overflowing,	31
No. in which privy vaults were offensive,	38
No. in which dividing fences were needing repair,	36
No. in which grounds were uncleanly,	3
No. admitting unvaccinated children,	6
No. of unvaccinated children in attendance,	30

MONTOUR COUNTY.

No. of schools inspected,	46
No. in which conditions were sanitary,	19
No. in which ventilation was poor,	0
No. in which light was poor,	0
No. in which water was poor,	0
No. in which privies were dirty,	13
No. in which privy vaults were full,	11
No. in which privy vaults were overflowing,	13
No. in which privy vaults were offensive,	12
No. in which dividing fences were needing repair,	19
No. in which grounds were uncleanly,	1
No. admitting unvaccinated children,	28
No. of unvaccinated children in attendance,	90

NORTHAMPTON COUNTY.

No. of schools inspected,	122
No. in which conditions were sanitary,	71
No. in which ventilation was poor,	2
No. in which light was poor,	0
No. in which water was poor,	3
No. in which privies were dirty,	11
No. in which privy vaults were full,	7
No. in which privy vaults were overflowing,	8
No. in which privy vaults were offensive,	14
No. in which dividing fences were needing repair,	24
No. in which grounds were uncleanly,	7
No. admitting unvaccinated children,	22
No. of unvaccinated children in attendance,	74

NORTHUMBERLAND COUNTY.

No. of schools inspected,	113
No. in which conditions were sanitary,	71
No. in which ventilation was poor,	1
No. in which light was poor,	1
No. in which water was poor,	1
No. in which privies were dirty,	27
No. in which privy vaults were full,	7
No. in which privy vaults were overflowing,	9
No. in which privy vaults were offensive,	30
No. in which dividing fences were needing repair,	26
No. in which grounds were uncleanly,	1
No. admitting unvaccinated children,	27
No. of unvaccinated children in attendance,	299

PERRY COUNTY.

No. of schools inspected,	98
No. in which conditions were sanitary,	73
No. in which ventilation was poor,	2
No. in which light was poor,	0
No. in which water was poor,	2
No. in which privies were dirty,	10
No. in which privy vaults were full,	2
No. in which privy vaults were overflowing,	1
No. in which privy vaults were offensive,	5
No. in which dividing fences were needing repair,	22
No. in which grounds were uncleanly,	2
No. admitting unvaccinated children,	4
No. of unvaccinated children in attendance,	25

PIKE COUNTY.

No. of schools inspected,	30
No. in which conditions were sanitary,	10
No. in which ventilation was poor,	0
No. in which light was poor,	0
No. in which water was poor,	0
No. in which privies were dirty,	12
No. in which privy vaults were full,	8
No. in which privy vaults were overflowing,	2
No. in which privy vaults were offensive,	8
No. in which dividing fences were needing repair,	21
No. in which grounds were uncleanly,	7
No. admitting unvaccinated children,	3
No. if unvaccinated children in attendance,	30

POTTER COUNTY.

No. of schools inspected,	125
No. in which conditions were sanitary,	45
No. in which ventilation was poor,	35
No. in which light was poor,	3
No. in which water was poor,	1
No. in which privies were dirty,	48

POTTER COUNTY—Continued.

No. in which privy vaults were full,	20
No. in which privy vaults were overflowing,	19
No. in which privy vaults were offensive,	46
No. in which dividing fences were needing repair,	62
No. in which grounds were uncleanly,	18
No. admitting unvaccinated children,	21
No. of unvaccinated children in attendance,	91

SCHUYLKILL COUNTY.

No. of schools inspected,	172
No. in which conditions were sanitary,	91
No. in which ventilation was poor,	35
No. in which light was poor,	0
No. in which water was poor,	4
No. in which privies were dirty,	53
No. in which privy vaults were full,	32
No. in which privy vaults were overflowing,	25
No. in which privy vaults were offensive,	43
No. in which dividing fences were needing repair,	32
No. in which grounds were uncleanly,	10
No. admitting unvaccinated children,	43
No. of unvaccinated children in attendance,	453

SNYDER COUNTY.

No. of schools inspected,	35
No. in which conditions were sanitary,	17
No. in which ventilation was poor,	1
No. in which light was poor,	0
No. in which water was poor,	1
No. in which privies were dirty,	19
No. in which privy vaults were full,	12
No. in which privy vaults were overflowing,	12
No. in which privy vaults were offensive,	17
No. in which dividing fences were needing repair,	8
No. in which grounds were uncleanly,	0
No. admitting unvaccinated children,	29
No. of unvaccinated children in attendance,	782

SOMERSET COUNTY.

No. of schools inspected,	139
No. in which conditions were sanitary,	83
No. in which ventilation was poor,	2
No. in which light was poor,	2
No. in which water was poor,	5
No. in which privies were dirty,	27
No. in which privy vaults were full,	2
No. in which privy vaults were overflowing,	21
No. in which privy vaults were offensive,	14
No. in which dividing fences were needing repair,	45
No. in which grounds were uncleanly,	13
No. admitting unvaccinated children,	90
No. of unvaccinated children in attendance,	2,119

SULLIVAN COUNTY.

No. of schools inspected,	77
No. in which conditions were sanitary,	51
No. in which ventilation was poor,	4
No. in which light was poor,	0
No. in which water was poor,	5
No. in which privy was dirty,	9
No. in which privy vaults were full,	0
No. in which privy vaults were overflowing,	0
No. in which privy vaults were offensive,	2
No. in which dividing fences were needing repair,	20
No. in which grounds were uncleanly,	3
No. admitting unvaccinated children,	15
No. of unvaccinated children in attendance,	93

SUSQUEHANNA COUNTY.

No. of schools inspected,	167
No. in which conditions were sanitary,	102
No. in which ventilation was poor,	2
No. in which light was poor,	0
No. in which water was poor,	0
No. in which privies were dirty,	38
No. in which privy vaults were full,	12
No. in which privy vaults were overflowing,	9
No. in which privy vaults were offensive,	19
No. in which dividing fences were needing repair,	45
No. in which grounds were uncleanly,	3
No. admitting unvaccinated children,	73
No. of unvaccinated children in attendance,	767

TIOGA COUNTY.

No. of schools inspected,	203
No. in which conditions were sanitary,	110
No. in which ventilation was poor,	25
No. in which light was poor,	4
No. in which water was poor,	6
No. in which privies were dirty,	57
No. in which privy vaults were full,	35
No. in which privy vaults were overflowing,	33
No. in which privy vaults were offensive,	60
No. in which dividing fences were needing repair,	43
No. in which grounds were uncleanly,	9
No. admitting unvaccinated children,	57
No. of unvaccinated children in attendance,	448

UNION COUNTY.

No. of schools inspected,	64
No. in which conditions were sanitary,	36
No. in which ventilation was poor,	29
No. in which light was poor,	0
No. in which water was poor,	0
No. in which privies were dirty,	16

UNION COUNTY—Continued.

No. in which privy vaults were full,	4
No. in which privy vaults were overflowing,	2
No. in which privy vaults were offensive,	8
No. in which dividing fences were needing repair,	16
No. in which grounds were uncleanly,	2
No. admitting unvaccinated children,	7
No. of unvaccinated children in attendance,	51

VENANGO COUNTY.

No. of schools inspected,	164
No. in which conditions were sanitary,	64
No. in which ventilation was poor,	47
No. in which light was poor,	0
No. in which water was poor,	10
No. in which privies were dirty,	38
No. in which privy vaults were full,	9
No. in which privy vaults were overflowing,	14
No. in which privy vaults were offensive,	24
No. in which dividing fences were needing repair,	81
No. in which grounds were uncleanly,	12
No. admitting unvaccinated children,	72
No. of unvaccinated children in attendance,	806

WARREN COUNTY.

No. of schools inspected,	108
No. in which conditions were sanitary,	43
No. in which ventilation was poor,	9
No. in which light was poor,	2
No. in which water was poor,	6
No. in which privies were dirty,	39
No. in which privy vaults were full,	16
No. in which privy vaults were overflowing,	14
No. in which privy vaults were offensive,	33
No. in which dividing fences were needing repair,	41
No. in which grounds were uncleanly,	12
No. admitting unvaccinated children,	19
No. of unvaccinated children in attendance,	217

WASHINGTON COUNTY.

No. of schools inspected,	206
No. in which conditions were sanitary,	129
No. in which ventilation was poor,	2
No. in which light was poor,	1
No. in which water was poor,	16
No. in which privies were dirty,	52
No. in which privy vaults were full,	27
No. in which privy vaults were overflowing,	32
No. in which privy vaults were offensive,	26
No. in which dividing fences were needing repair,	44
No. in which grounds were uncleanly,	32
No. admitting unvaccinated children,	55
No. of unvaccinated children in attendance,	760

WAYNE COUNTY.

No. of schools inspected,	35
No. in which conditions were sanitary,	12
No. in which ventilation was poor,	11
No. in which light was poor,	0
No. in which water was poor,	0
No. in which privies were dirty,	9
No. in which privy vaults were full,	5
No. in which privy vaults were overflowing,	3
No. in which privy vaults were offensive,	6
No. in which dividing fences were needing repair,	19
No. in which grounds were uncleanly,	3
No. admitting unvaccinated children,	14
No. of unvaccinated children in attendance,	45

WESTMORELAND COUNTY.

No. of school inspected,	174
No. in which conditions were sanitary,	84
No. in which ventilation was poor,	9
No. in which light was poor,	16
No. in which water was poor,	7
No. in which privies were dirty,	48
No. in which privy vaults were full,	29
No. in which privy vaults were overflowing,	22
No. in which privy vaults were offensive,	35
No. in which dividing fences were needing repair,	65
No. in which grounds were uncleanly,	11
No. admitting unvaccinated children,	97
No. of unvaccinated children in attendance,	1,563

WYOMING COUNTY.

No. of schools inspected,	67
No. in which conditions were sanitary,	20
No. in which ventilation was poor,	10
No. in which light was poor,	0
No. in which water was poor,	5
No. in which privies were dirty,	36
No. in which privy vaults were full,	21
No. in which privy vaults were overflowing,	23
No. in which privy vaults were offensive,	33
No. in which dividing fences were needing repair,	26
No. in which grounds were uncleanly,	10
No. admitting unvaccinated children,	26
No. of unvaccinated children in attendance,	156

YORK COUNTY.

No. of schools inspected,	313
No. in which conditions were sanitary,	200
No. in which ventilation was poor,	13
No. in which light was poor,	2
No. in which water was poor,	5
No. in which privies were dirty,	45

YORK COUNTY—Continued.

No. in which privy vaults were full,	10
No. in which privy vaults were overflowing,	38
No. in which privy vaults were offensive,	29
No. in which dividing fences were needing repair,	78
No. in which grounds were uncleanly,	13
No. admitting unvaccinated children,	69
No. of unvaccinated children in attendance,	637

Division of Laboratories and Experimental Station.

ALLEN J. SMITH, M. D., Director of Pathology.

HERBERT FOX, M. D., Chief of Laboratories.

OPERATIONS OF THE LABORATORIES AND EXPERIMENTAL STATION FOR THE YEAR 1907.

The opening of the year 1907 began the real work of the Laboratories, for almost in the first week of the year, the supplies, which had been announced a short time previously by our circular pamphlet, were distributed. The work during the last two months of 1906 was but a trifle compared with that which now came to us through the use of our containers. The favor with which the Laboratory was received was shown by the great demand for our outfits, so that in February, those intended for malaria and those for sputum were doubled in number.

Experience during the year has taught us how we may increase our efficiency and it will be our endeavor to improve our service by this experience. Most physicians realize that pathological work is merely an adjuvant to clinical diagnosis. Clinical facts may be of considerable assistance to laboratory workers however, notwithstanding the fact that tests are based on scientific principles and should be uniform in their results when exact conditions are given. Clinical conditions frequently modify pathological tests so as to render them almost useless. A noteworthy example is the latency of malaria or the exhibition of quinine before taking a specimen of blood for examination; again the Widal reaction is occasionally absent at the height of typhoid fever. With these facts in mind it is easy to see how exact clinical and accessory data may be helped to the laboratory workers in making a report.

By furnishing details the physician may help the Department to collect facts which will eventually be of service to the giver. Details also serve as a safeguard to the physician who sends a specimen to us, for by means of them, identification is more exact.

In order to have these details in a serviceable form a definite system must be adopted and adhered to strictly. There are some instances which must be judged according to their individual merits and exception made. The object of the Laboratory is to serve the people of the State through their physicians, and an exception which will accrue to the benefit of the patient should be made, even at the cost of a little time.

For routine work the following is our method; the principle upon which this system has been operated is to make an examination directly upon fulfilment of all requirements (by the applicant) and

to report the result immediately. When a specimen arrives with its card, it is immediately given a laboratory and a series number. These serve as identification and as a direct guide to a file. All speciments are numbered according to the order in which they arrive. As soon as the proper record of the arrival of the said specimen is completed in the office, it is given to the person who is to make the test and it is his duty to see that the request card and specimen agree. Upon completion of the analysis, the request card with the result written in the proper space by the examiner is returned to the clerk who makes out the report of our special form and submits the two cards to the Chief of the Laboratories to be reviewed. Should the examination require more than one day, the request card is returned to the clerk who places it in the active list in the respective drawer of the filing cabinet. By this means no card is lost.

With regard to those specimens for which the request card is sent in a special envelope, special attention must be given. If they arrive in different mails, as is usually the case, the date of arrival is marked upon them and they are kept in a separate place. If the accompanying part, card or outfit as the case may be, does not arrive in one week, a post card announcement of the same is made to the name and address on the part at hand, indicating the missing part. If no complement to our part is received in one months' time, the can is sterilized and cleaned, or the request card is marked "Not examined," and kept in a separate file. The cans are not opened to examine into the state of the specimen until the request card arrives. It is manifestly unwise to open a package probably containing infective material in an office where there are no facilities for its proper handling. This explains why we frequently send out a report stating that the specimen was unfit for examination.

The description will serve to call attention to the need of care in sending specimens. The packing has very often been careless, the outer can of our mailing case not infrequently requiring sterilization because of leakage of urine, sputum, etc., from the inner, its lid or that of the salve box contained therein having been insecurely screwed on. Frequent sterilization is hard on the cans. If specimens are properly wrapped in cotton and the lid of the inner can tightly secured, only the inner can need be sterilized. This is done after every using. The Postal Department requires the use of two cans, of which the smaller must be inverted into the larger. Only one of these is sometimes sent. When cans are sent in an improper manner, the sender is notified of the irregularity. The Laboratory regrets to report a greater evil. That is the sending of dried specimens of sputum in cloth or cotton in paper packages, loosely tied pasteboard boxes or in Widal envelopes. Comment on the public danger of such a practice need not be made. The sender is notified

of the requirements of the Laboratory and the regulations of the Postal authorities. A list of such offenders is kept and should the same thing occur twice by the same individual, due notice will be given to the Department.

The increase of the work during the year necessitated an augmentation of the staff of the Laboratory. At the time of the investigation of the epidemic of Poliomyelitis in the northwestern section of the State, Dr. J. B. Rucker was appointed Assistant Bacteriologist to carry on the work in the Laboratory. On account of the great increase of routine work incident to the extensive water analyses for the Division of Sanitary Engineering, a new Diener, John R. Taylor was employed September 1st. The price of experimental animals having risen so much in the Fall, measures were taken to raise small stock at our Experimental stable. A stableman, Timothy Quinlan, was employed for this purpose and to take care of the cows. The animals at the Laboratory are in charge of the second diener. The stock of guinea pigs to date is not large enough to supply our demands. The breeding is progressing as well as can be expected in new bins.

During the year the Laboratory has received periodically the publications of the Hygienic Laboratory of the United States Marine Hospital and Public Health Service and of the Laboratory of the Division of Animal Industry. Some few individual contributions have also been received. Books purchased for the Laboratory during the year have been Chester's Manual of Bacteriology and Migula's System der Bakterien. These books are of great service in water and sewage work.

EXAMINATIONS.

The number of examinations made during the year (4,345) is tabulated in the accompanying chart. The total was quite expected although this was the first year of our work. The general tendency in numbers, as can be seen by consulting the column of totals, was to rise, but this is not at all regular. Water analyses form the greater part of the work. This was due to the large number of examinations made for the Division of Sanitary Engineering during their investigations on water systems. These are of course greatest in the open months, having the highest point in September. The number of other examinations varied but little. They are greater in the cold months.

EXAMINATIONS DURING THE YEAR 1907.

1907	A	B	C	D	E	F	G	H	J	K	Total
Jan.,	10	36	85	12	5	7	5	96	7	5	268
Feb.,	5	39	65	4	2	10	2	255	4	.....	386
March,	3	29	65	4	6	7	.....	298	2	1	415
April,	2	17	80	7	5	5	10	217	1	4	348
May,	6	28	65	8	6	10	1	89	.....	5	218
June,	1	22	56	5	3	5	3	251	.....	4	350
July,	7	36	78	2	6	5	4	376	1	2	517
August,	8	50	54	5	2	6	9	357	3	9	513
Sept.,	7	39	55	2	2	6	5	440	1	8	565
Oct.,	8	36	64	2	2	11	6	185	1	6	321
Nov,.	3	31	75	4	9	10	5	60	7	12	206
Dec.,	2	16	127	3	1	7	9	64	3	16	218
	62	369	869	58	49	89	59	2,688	30	72	4,345

A—Malaria.
B—Widal.
C—Sputum.
D—Urine.
E—Pathological fluids.
F—Pathological growths.
G—Milk and butter.
H—Water.
J—Feces.
K—Miscellaneous.

MALARIA. Of the sixty-two searches for malarial organisms only two, or three per cent. were positive. These two came in July and August from the same place, Plymouth, Luzerne county. It is unfortunate for the result of these searches, that quinine is so often given before the blood smear is made.

WIDAL TEST. The records obtained by the Laboratory give little upon which to comment. Aside from the vicinity of Scranton, Ridgway and Franklin, the sources of blood for the Widal test were well distributed over the State. From the localities mentioned, the number was considerable. Since there is no checking off of results and diagnosis at the Laboratory, the percentage of positive Widal tests to establish cases of enteric fever cannot be given. Seventy-five (20.4 per cent.) of 367 tests were positive and two were unfit for examination. Although many of the specimens were doubtless sent to exclude typhoid fever, the percentage of positive findings seems rather small. One possible cause which helped to reduce our positive findings was our attempt to carry out the test even if the blood were imperfectly prepared or not in sufficient quantity. The pieces of paper are frequently folded before the blood is dry, thus spoiling the blood drop and rendering it difficult to get sufficient scrapings to produce the proper color in dilutions. Our test is rigid, but strict observance of dilution and time limit prevents false reactions due to foreign substances which are sometimes mixed with the blood from the patient's or doctor's hand when taking the specimen.

SPUTUM. Although this examination was intended to cover all forms of bacteriological infection, all but two specimens have been sent to be searched for the tubercle bacillus. Requests have been

made to search for other bacteria at the same time. The infection usually suspected is with pneumococcus, streptococcus, or influenza bacillus. In reporting this examination it has been the custom to say "Pneumococcus, Streptococcus or Influenza forms present or absent," and the distinctive Gram stain has been used for this purpose. The cultural determination of these species of bacteria requires a long and very careful procedure which would delay the report to an unreasonable time, probably delaying the treatment of the individual. It is considered safe to speak of the respective "forms" being present when one sees typical, Gram positive, encapsulated diplacocci, or chains of cocci, or typical, small pointed Gram negative, intracellular rods. When examining for the tubercle bacillus, our technic has been very rigid. After staining as usual with Ziehl-Nielson Carbol Fuchsin the slides are decolorized with twenty-five per cent. sulphuric acid in absolute alcohol and counterstained with methylen blue. This decolorization is very complete and excludes any pieces of mould or smegma bacilli which are occasionally encountered in the sputum. When searching under the microscope, no slide is admitted which contains any traces of the red stain and two tubercle bacilli must be seen at different parts of the field on a perfectly blue ground before a specimen is considered as containing tubercle bacilli.

No report is made to this Laboratory as to the corroboration of the clinical by the pathological diagnosis. Among the 869 specimens during the year, 452 were from males, 125 of which were positive, 297 negative and thirty unfit for examination; 417 were from females, 114 of which were positive; 275 were negative and twenty-eight unfit for examination. From 869 examinations it does not seem justifiable to draw any conclusions. This at least can be said, that while there were thirty-five more specimens from males than females, the proportions of positive, negative and unfit for examination are almost identical. The chief occupation represented by males was classed as laborers, with farmers and clerks tied for second place. Among the females, housework was far ahead of all other occupations.

The number of specimens of sputum maintained about an even height during the year until December when it jumped forty-two higher than it had ever been before. This was due to the opening of several Tuberculosis Dispensaries in the State.

To the sending of the sputum more than any other substances, do the remarks on the care in the preparation and packing apply. More than six per cent. of sputum specimens were in a condition in which it would be extremely dangerous for the laboratory worker to handle them. Even though the examiner wore rubber gloves and opened the cans at a special desk covered with carbolized paper, the work

would be very dangerous and all precautions should be taken in preparing the inner bottle so that fluid sputum does not escape or dry sputum blow around. Especially to be condemned is a habit some physicians have of placing the request card between the outer and inner can where it is not found, (for the reason stated above) and where it can be contaminated, requiring a new one in the laboratory and destruction of the original.

At the end of the year the Commissioner approved alterations and improvements in our methods of handling sputum by which scores of specimens can be examined in one day. This was necessary because of the opening of Dispensaries for Tuberculosis throughout the State under the appropriation for that purpose in 1907.

URINE. These specimens still come in for general examination. Perhaps we have had two hundred such applications during the year, and should these have been done, hundreds of others would have followed, necessitating a special assistant for that work. The amount which can be accommodated in our salve boxes is really insufficient and if it were not, urine which has traveled for a day or two is not fit for examination. Bacteriological examinations of urine require a long time and considerable care. We therefore notify physicians upon the arrival of such specimens that the examination is being done and will be reported upon its completion. Requests for diazo reactions are very few and usually accompany blood for Widal tests.

PATHOLOGIC FLUIDS. Requests for examinations of specimens of this class are few. They have consisted chiefly of pus and pleural or peritoneal fluid. They have been packed well as a rule, much more carefully than the more dangerous sputum. To such specimens do the remarks about clinical notes in the introduction apply forcibly. The bacteriologist is at sea in examining pus or pleural exudate if he know nothing of the case, or if, as frequently occurs, the physician fail to make any direct request, leaving to the laboratory to make a pathological diagnosis. Reports on such samples should be made as rapidly as possible. A few notes may save several days and keep the examiner from floundering around in a score of pathogenic species of organisms, many of which require a special and delicate technic not usual in routine culture work.

PATHOLOGIC GROWTHS. These specimens have slowly increased in number. They are almost never sufficiently described. Very many of them do not give the locations from which the growth came. This entails correspondence to obtain data which is of the greatest importance in microscopical investigation. We have relatively less information about these specimens than any other and we need more. The pieces of tissue frequently come without being covered with preservative, thereby delaying the examination by

necessitating two days of fixation here. The microscopical examination of tissues is made by Dr. Allen J. Smith. Report of the finding is not made for several days, due to the method of fixing, imbedding, cutting and staining necessary in histological technic. Upon receipts of sections of tissues a post card is returned to the sender announcing its arrival, stating that examination requires several days and the report will be sent immediately upon its completion. The reason of undue delay is usually unsatisfactory notes, commented upon above. A sufficient length of time for careful study must be given especially if there be any suspicion of malignant growth upon which an operation might depend. The average length of time which has elapsed between the receipt of a specimen and its report has been ten days.

WATER. This has formed the greatest part of our work and is under the care of Dr. Rivas, who personally makes all the analyses. When samples are received they are recorded by the clerk. The Laboratory and series numbers are put on each bottle by a gummed label. A card is then prepared, which contains all possible means of identification given on the bottles and in a communication from the sender, which must be received or the water is not analyzed. A copy of such a card is given further on. This is placed with the bottle and handed direct to Dr. Rivas whose duty it is to see that the descriptions on the card and on the bottle agree. The samples of water are thus handled by only two persons and no confusion can result. Dr. Rivas' method of analysis is as follows:

The examination of the water depends upon its character; that is, the source and clearness. As a routine procedure, one cubic centimeter of the water is plated on plain neutral agar, neutral gelatin and litmus lactose agar, and incubated at thirty-seven degrees C. in the case of agar and at twenty degrees C. for the gelatin plates. After forty-eight hours at thirty-seven degrees C., the number of colonies on agar plates is counted. Similar countings are made of the gelatin plates at twenty degrees C. at the expiration of the same time. After twenty-four hours of incubation at thirty-seven degrees C., the litmus lactose agar plates are examined for the presence of pink colonies resembling B. coli communis, and if any be present, their number is counted and a record of the same made. A number of these colonies in definite relation to the whole is transplanted to one per cent. neutral dextrose bouillon in fermentation tubes and incubated for twenty-four hours at thirty-seven degrees C. at the end of which time the fermentation of the dextrose is noted and sub-sultures are made from the tubes which show gaseous fermentation. These are inoculated on meat sugar free bouillon, gelatine and milk, and placed in the incubator at 37 degrees C. for at least forty-eight hours, or longer as the case

may be. After the incubation at thirty-seven degrees C., the coagulation of the gelatine is determined by placing the tubes on ice water until hardening or liqueration is noted; observations are made on the conditions of the milk. The bouillon cultures are examined for indol and also for Test No. 2. This is a pink coloration produced immediately after the addition of about one cubic centimeter of a ten per cent. sodium hydroxide solution followed by one cubic centimeter of a fifty per cent. H^2SO^4 solution, to a tube of the culture.

The fermented tubes are returned to the thirty-seven degrees C. incubator and, after forty-eight hours, examination is made as to the percentage of gas and relation of hydrogen to carbon dioxide. Before this reading is made, the culture is examined for Test No. 1. This consists of a slight pink coloration after boiling about one-fourth of a cubic centimeter of the culture in about five cubic centimeters of ten per cent. solution of sodium hydroxide. Finally the motility, coloration by Gram and general morphology of the culture is considered in making the determination. A typical B. coli culture besides coagulating the milk, producing indol, failing to liquefying gelatine, fermenting dextrose, giving a typical relation of hydrogen to carbon dioxide and a Gram negative bacillus, should also be positive to Test No. 2 and 3 and negative to Test No. 1. (Refer to No. 9 of Laboratory publications.)

A typical reaction of B. coli will answer to the characteristics as stated on the card below.

Lab. Form No. 30.

PENNSYLVANIA DEPARTMENT OF HEALTH LABORATORIES.

BACTERIOLOGICAL WATER ANALYSIS.

No. 3431. Source, Ridgway. Date, (H2245) 9-13.

From Cummings. Time of collection,.....

Time rec'd, 3 P. M. Condition, ice. Time plated, 3.15.

Gelatine or agar, Agar. Incubation at 37. deg. C. for 48 hrs.

No. of pink colonies on lit. lact. agar from 1 c. c., 300; from..... c. c.....

No. of bluish purple colonies on lit. lact: agar from 1 c. c.....; from.....c. c.

Total No. of aerobic micro-organisms per c. c., 28,000.

Total No. of liquefying micro-organisms per c. c., ...

No. of B. Coli in 1 c. c., 180; in .....c. c. .....

Other micro-organisms per c. c. .....; in ..... c. c. .....

Remarks: No. 21, Spring.

No.	Character of Colony.	Fermentation.				Rivas.			Coag. of Milk.	Indol.	Liq. of Gelat.	Motility.	Morphology.		Resembling B. Coli.	Remarks.
		Turbidity.	% of Gas. 24 hrs.	% of Gas. 48 hrs.	% of Gas. H. / Co_2	Test No. 1.	Test No. 2.	Test No. 3.					Grams.	Shape.		
	Pink	+	+	50	65/35	O	+	O	+	+	O	+	O	Bacillus	+	Saccharolyte
	"	+	+	50	65/35	+	O	+	+	O	O	+	O	"	O	"
	"	+	+	35	70/30	O	O	O	+	O	O	+	O	"	O	"
	"	+	+	50	60/40	O	+	O	+	+	O	+	O	"	+	"
	"	+	+	50	65/35	O	+	O	+	+	O	+	O	"	+	"

The number of B. coli per cubic centimeter is determined by taking into consideration the number of positive cultures obtained among those selected in relation to the number of pink colonies in on cubic centimeter. That is, if three colonies out of six which were chosen from a litmus lactose agar plate in which there were twenty colon like colonies, prove to be true B. coli the water from which the original plate was made is considered to contain ten B. coli per cubic centimeter or per volume used to make the primary plate. If the water is known to originate from polluted sources or to contain a high number of bacteria, dilutions are made which will enable one to count colonies more accurately. The procedure is the same as above, and the final result obtained by multiplying by the dilution used. If the water be thought very good, large measured quantities are incubated with an equal quantity of bouillon for twenty-four hours, at the end of which time dilutions of the culture are made and plated on litmus lactose agar. From this point on, the procedure corresponds to the one outlined above.

When this analysis is complete and the result marked in the proper places on the card, this is returned to the clerk who copies it in letter form to be sent to the person desiring the analysis. This letter with the card is checked by the clerk, handed to the Chief of the Laboratories, for further check, and the report is mailed. Up to September, a bi-monthly report was made to the Department, but since that time a carbon copy of every water analysis has been sent to the Division of Medical Inspection, and to the Division of Sanitary Engineering.

Rivas' method is rapid and accurate, enabling us to make reports always within a week. His work, some of which accompanies this report, has enabled him to exclude the colon like organisms and determine only those of the true B. coli group, which we look upon as an indication of pollution. Report is made as a routine upon the number of organisms growing at thirty-seven degrees C. on neutral agar and the numerical presence of the B. coli is one c. c We are always ready to make further tests upon requests, to the extent shown on the card.

Early in the year, samples of water were sent in bottles obtained by the sender, being collected according to instructions sent by this Laboratory or by the Department at Harrisburg. In the spring, the Department prepared express boxes and tin cans for the transmission of water samples. Two hundred of the former and five hundred of the latter are in use. The boxes with an inner tin tray having lateral ice compartments are intended for six (6) bottles, while the can will accommodate only one (1), if surrounded by ice.

The following is a list of places, as to county, from which water has been shipped. The figures opposite indicate the number of samples from the respective places:

ALLEGHENY:		CAMBRIA:	
Ingram,	1	Carrolltown,	1
Oakdale,	3	Cresson,	2
ARMSTRONG:		Johnstown,	49
Dayton,	12	CARBON:	
Ford City,	15	Palmerton,	4
Kittanning,	338	CENTRE:	
Parkers Landing,	1	Phillipsburg,	1
BEDFORD:		CHESTER:	
Everett,	5	Coatesville,	2
Woodbury,	2	Devon,	57
BERKS:		Kennett Square,	2
Hamburg,	1	Oxford,	2
Reading,	4	Malvern,	3
Shoemakersville,	1	CLARION:	
BLAIR:		New Bethlehem,	1
Altoona,	1	CLEARFIELD:	
BRADFORD:		Clearfield,	10
Athens,	6	Dubois,	6
Canton,	1	Mahaffey,	6
Wyalusing,	1	Penfield,	1
BUCKS:		Woodland,	2
Doylestown,	1	CLINTON:	
Yardley,	17	Bitumen,	4
Taylorville,	6	COLUMBIA:	
BUTLER:		Benton,	1
Eau Claire,	5	Berwick,	8
Evans City,	1	Bloomsburg,	2
Slippery Rock,	5	Catawissa,	6

CUMBERLAND:	
Camp Hill,	6
Carlisle,	6
Newville,	1
W. Fairview,	1
DAUPHIN:	
Berrysburg,	1
Harrisburg,	69
Inglenook,	2
Millersburg,	2
Progress,	2
Steelton,	9
DELAWARE:	
Ashton Mills,	1
Boothwyn,	2
Chester,	10
Eddystone,	4
Media,	3
Ridley,	1
Trainer,	1
Wayne,	6
ELK:	
Johnsonburg,	3
Ridgway,	128
ERIE:	
Corry,	16
Erie,	1
Fairview,	1
FAYETTE:	
Dawson,	19
Dunbar,	6
FRANKLIN:	
Chambersburg,	6
Fannettsburg,	1
Greencastle,	1
Marion,	1
Mercersburg,	3
Mont Alto,	10
St. Thomas,	2
FULTON:	
Hustontown,	5
GREENE:	
Mt. Morris,	2
HUNTINGDON:	
Huntingdon,	6
INDIANA:	
Black Lick,	1
Homer City,	2
Plumville,	1
LACKAWANNA:	
Scranton,	682
LANCASTER:	
Bath,	1
Christiana,	2
LANCASTER—Continued.	
Conewago,	1
Elizabethtown,	1
Lancaster,	2
Mount Joy,	1
LAWRENCE:	
Ellwood City,	4
New Castle,	11
LEBANON:	
Colebrook,	5
Lawn,	141
Mt. Gretna,	534
LEHIGH:	
Allentown,	6
Catasaqua,	1
New Tripoli,	5
Slatedale,	1
Slatington,	3
LUZERNE:	
Hazleton,	12
Nanticoke,	13
White Haven,	3
LYCOMING:	
Jersey Shore,	14
Williamsport,	3
McKEAN:	
Custer City,	1
MIFFLIN:	
Lewistown,	15
MONTGOMERY:	
Ambler,	1
Ardmore,	8
Bridgeport,	1
Bryn Mawr,	2
Gratersford,	3
Hatboro,	5
Jenkintown,	6
Limerick Sq.,	3
Norristown,	9
Above Norristown,	2
MONTOUR:	
Danville,	3
NORTHAMPTON:	
Bethlehem,	12
Siegfried,	3
NORTHUMBERLAND:	
Herndon,	1
Shamokin,	3
Sunbury,	10
PERRY:	
Marysville,	7
POTTER:	
Galeton,	1

7—16—1907

SCHUYLKILL:	
Ashland,	1
Frackville,	6
Orwigsburg,	1
Schuylkill Haven,	3
SUSQUEHANNA:	
Hallstead,	1
Montrose,	3
TIOGA:	
Wellsboro,	8
Westfield,	2
UNION:	
Laurelton,	2
VENANGO:	
Franklin,	28
Oil City,	7
WARREN:	
Warren,	44
Youngsville,	2
WASHINGTON:	
Monongahela,	8
Murdocksville,	1
WAYNE:	
Hawley,	1
Honesdale,	5
WESTMORELAND:	
Delmont,	6
Grapeville,	1
Jeannette,	6
Latrobe,	25
Mt. Pleasant,	1
Scottdale,	17
Webster,	2
WYOMING:	
Laceyville,	1
YORK:	
Dallastown,	12
Dover,	3
Hanover,	2
Stewartstown,	2
Wrightsville,	3
York,	4

MILK AND BUTTER. There have been no butter samples this year. The analysis of milk is comparable to that of water. No applications for Tubercle Bacilli, Streptococcus or number of Leucocytes have been made. The following is a list of samples analyzed:

ARMSTRONG:	
Kittanning,	9
Ford City,	10
BEDFORD:	
Everett,	1
BUCKS:	
Yardley,	2
BUTLER:	
Eau Claire,	1
CENTRE:	
Phillipsburg,	4
CHESTER:	
Malvern,	1
CLEARFIELD:	
Dubois,	6
DELAWARE,	1
ELK:	
Johnsonburg,	3
ERIE:	
Corry,	3
LAWRENCE:	
New Castle,	2
LEHIGH:	
Catasaqua,	3
MONTGOMERY:	
Hatboro,	3
Norristown,	3
SUSQUEHANNA:	
Montrose,	3
VENANGO:	
Oil City,	3
WAYNE:	
Hawley,	1

FECES. As will be seen on the tabulated list, these specimens were the fewest in number. With reference to these samples, we always receive too few notes and very indefinite requests. Most of the requests have been for a bacteriological diagnosis of an obscure clinical condition, a thing almost impossible to do in the vast

majority of cases. Once in twelve times, tubercle bacilli have been found, and once in seven trials typhoid bacilli were discovered. The specimens are usually packed badly, making an examination highly offensive, if not dangerous.

MISCELLANEOUS. These have been almost altogether swabs and cultures from throats suspected of diphtheria. No unusual number has come from any one place. They have been sent in outfits (No. 3) or brought from the vicinity of Philadelphia by hand. A report will be made immediately on any swab sent in one of the No. 3 outfits with a request card, as described for other specimens which are sent in this can. Several reports have been made by telegraph at the physicians' expense.

RESEARCH WORK OF THE LABORATORY.

During the year, the Laboratory has had under investigation the following subjects.

1. The effect of Normal Serum upon the Tubercle Bacillus.
2. The Pollution of Water by Sewage containing the Tubercle Bacillus.
3 Reaction of the Opsonins of the Elephant on the Tubercle Bacillus.
4 Germicidal activity of Liq. Cresolis Compositions, U. S. P.
5. The Predominating Organisms in Feces and Sewage.
6. Improved Rapid Test for Indol.
7. Improved Method of Sterilization of Media.
8. Contributions to Differentiation of B. Coli from allied Species in Drinking Water.
9. Contributions to the Study of B. Typhosus and B. Coli in Drinking Water.
10. Study of Degreased Tubercle Bacilli.
12. The effect of Bile and Pancrease on the Tubercle Bacillus.
13. Study of the Fluid of Dixon.
14. Effect of repeated injections of Tuberculin in healthy cows.
15. Effect of Normal Serum Inoculations on course of inoculated Tuberculosis.
16. Study of B. Coli from Intestinal Tract of Fishes.

No discussion of Nos. 1-9 will be made here, because the entire articles accompany this report. The experimental work in progress will be described up to its present status. In the following work the experiments are not sufficient to put them in final form:

(10). Study of the Degreased Tubercle Bacilli and their Solutions.

In all our experiments, virulent organisms were used, a fact which must not be lost sight of in judging the results of experiments, which in some instances seem favorable to the products used. The rationale of using the degreased organisms goes back to the original work of Dr. Dixon, who was able to produce an immunity by a salt solution extract of avirulent organisms after washing in ether. In order to rid the organisms of most of the irritant wax, a much larger exposure to ether was made than originally used by Dr. Dixon. The method was as follows:

A large quantity of mixed bovine and human tubercle bacilli from an equal number of cultures, which had been grown for Old Tuberculin, was filtered off, killed by heat and dried in a vacuum dessicator. They were then weighed and placed in a soxhlet. The preliminary removal was made with 95 per cent. alcohol. When the syphoning fluid began to clear, ether was substituted and allowed to extract until the cooled ethereal extract gave no precipitate. The time necessary to achieve this varies with the dryness and size of the clumps. Even after this indication is reached, a little wax may be demonstrated in the bacillary bodies by staining. It seems impossible to remove it all. When grinding in ball mill or mortar, this may be easily seen. The resulting mass is a dirty grayish white powder, which crumbles very easily but is still greasy. Martin and Vaudremer say that after six weeks' extraction with petroleum ether all the wax may not be removed. This mass was dehydrated again in a vacuum dessicator, and stored in bulk. Sixty-five grams of moist T. B. mass lost 52.33 in drying and 6.67 grams in extraction. I believe that after two days' extraction little weight is lost. These figures are from two days' extraction. Six days' extraction at a subsequent time gave as comparable weights 76.5, with loss of 64.8, and after extraction a loss of 6.58 grm. The alcohol used in the preliminary degreasing is always stained a distinct brown, while the ether extract is not colored.

The degreased bacillary mass is spoken of as our Experimental Product No. 5. When used, this is weighed out dry and ground up in salt solution in appropriate doses for injection. In preparing our syringes, it is ground in a ball mill in a definite decimal proportion on the basis of 10. It is standardized by evaporating given quantities to dryness and weighing the residue; from this weight the amount in one c. c. is computed. Dilutions of this in salt solution are made and with this syringes are filled. These syringes being used at present contain .000001 gram.

As a sub-product of this degreased bacillary mass, a salt solution extract is made and is called No. 6 Porcelain, because it is now filtered through porcelain, the original solution having been passed through paper. This is made by grinding up a definite quantity

with salt solution (.6 per cent.) in proportion as above of 1-10, placing this suspension in a shaking machine for eight hours and allowing it to remain 16 hours at room temperature. It is then filtered through a porcelain candle, the filtrate being our product. This filtrate is a faintly yellow tinged fluid. This is likewise put in syringes in quantities equalling an extraction of .0001 gram. A half of one per cent. carbolic is added to all solutions to maintain sterility.

TOXICITY. Repeated large doses, 1 mg. for example, of this dead degreased bacillary mass given at short intervals will cause a loss of weight in healthy animals, and they will succumb quite rapidly to tuberculosis after injections of virulent living bacilli. We have not had, however, the experience of Vaughan and Wheeler that hemorrhagic peritonitis follows the injection of tubercle bacilli in pigs which have been injected once or several times with the dead degreased bodies. Occasionally, experimental pigs will die shortly after the second injection, but without signs of anaphylaxis or hemorrhage, only a little serous effusion being present. We are working on the sensitization of No. 5 and tubercle bacilli for one another, but all we can say now is that they do not appear to cause anaphylaxis. Single large doses of No. 5 and No. 6 Porcelain have no toxic effect in healthy animals. Experiments in actively immunizing guinea pigs and rabbits are now being carried out, using great care so to time the injections that no great loss of weight occurs, and that no slight loss occurs continuously. Originally experiments in active immunity and vaccination were made with .1 mg., but experience has shown that guinea pigs endure .001 mg. very frequently repeated better than larger doses less often.

In reference to vaccination of tuberculous animals, one experiment may be given on a chart which will include both No. 5 and No. 6 Porcelain. These pigs all received .1 mg. 8 weeks' bovine organisms one week before beginning these injections. Doses of .1 mg. of No. 5 will cause a temperature re-action in tuberculosis. The reaction after No. 6 is uncertain, sometimes quite appreciable, other times entirely absent.

Product.	Quantity.	No. of injections.	Weight change.	Life.	Post Mortem.
277, No. 5, ...	.1 mg., ...	3	—105 gms.,..	38 d.,..	Caseous T.Bc. in liver, spleen and omentum.
278, No. 5, ...	.1 mg., ...	1	?	18 d.,..	Catarrhal pneumonia. nodule at site of inoculation.
279, No. 5, ...	.1 mg., ...	2	— 20 gms.,..	20 d.,..	Cheesy nodule at site of inoculation. Few cheesy T.-Bc. in liver, omentum infiltrated.
280, Control, ...	.1 mg., ...	0	0	9 d.,..	Cheesy nodule at site of inoculation, acute miliary T.-Bc. of peritoneum.
281, No. 6 Porc.,.	Sol. = .1 mg.,..	2	— 60 gms.,..	35 d.,..	General Tuberculosis.
282, No. 6 Porc.,.	Sol. = .1 mg.,..	2	— 45 gms.,..	35 d.,..	General Tuberculosis.
283, No. 6 Porc.,.	Sol. = .1 mg.,..	2	—210 gms.,..	47 d.,..	General Tuberculosis.

While this series is not final by any means, it will be seen that the average length of life in the treated animals is longer than that of the control. It is possible, indeed highly probable, that the dose of No. 5 was too great, because the animals live longer after treatment with the Salt Solution Extract which is naturally less irritating than the bodies themselves. All these injections have been made subcutaneously. We are proceeding with small doses, using great care that continued loss of weight does not ensue.

The pathologic effect of large doses on healthy animals has been very interesting. The lymphatic organs, especially the spleen, seem to bear the brunt of all their activity. Quite constantly, after injections of large doses of the degreased bacillary mass, a tubercular splenitis occurs, as shown by great increase in the endothelium and a cortical arrangement of the small round cells in the follicles. Sometimes the process will be quite diffuse, there being only a wide spread endothelial hyperplasia without nodular arrangement. When the process is tubercular in type, minute nodules are visible to the naked eye, but, when the process is diffuse, there is merely a firm swelling of the organs as a whole; no giant cells are present. No bacteria can be found in these areas. The longer the death after the last injection is delayed the more diffuse is the process. The beginning of this process is undoubtedly a focal necrosis which appears usually in the center of a follicle, but which may be present in the pulp. This is rapidly surrounded by endothelial cells and the tubercular type assumed. The focal necroses seem to occur more characteristically after injection with the solutions of the degreased organisms, while the cellular change begins earlier after the use of No. 5 itself.

These products are being supplied to the Sanatorium of the Department in antitoxin syringes, each containing one dose of the respective solution. When a lot of syringes are filled, they are

incubated at 37 deg. C. for 48 hours, and a large dose of the stock solution is injected under the skin of a guinea pig, both done to insure sterility. In no instance has any tube shown any growth, nor has any pig exhibited symptoms or loss of weight.

(11) **The Effect of Bile and Pancreatic Juice on Tubercle Bacilli.** One hundred grams of pancreas were removed from freshly killed hogs, (which had been passed by the inspector) and freed as much as possible from fat. From these animals, 80 c. c. of bile was aspirated from the gall bladder. The pancreas was cut fine and ground in a mortar. The juice which exuded was a dirty gray material containing many oil drops. Many pieces of the gland remained, and were treated as part of the juice. Fibres were removed.

One part (15 grams) was mixed with human and bovine tubercle bacilli, and this mixture allowed to remain together three weeks. They were examined every day for a week, and then every three days. No considerable change was noted in the form, size or straining properties of the bacteria at the end of three weeks; they were injected into quinea pigs, which animals died, one before, another after the control animal.

Another portion was mixed with 50 c. c. fresh normal bovine serum and tubercle bacilli, as above, and allowed to act three weeks. The result of observation along the same lines of structure and virulence, as above, were the same; that is, no change occurred in the organisms.

A large quantity of the ground pancreas (40 grams) was covered with glycerine and allowed to extract ten days. The extract showed the presence of all enzymes of the pancreatic juices, except the milk curdling ferment, the presence of which was questionable. One third of this extract was mixed with an equal quantity of fresh hog bile and allowed to act upon tubercle bacilli, while a second third only received the organism. The last portion was kept at ice box temperature during the fourteen days that the first two portions were acting at 39 degrees C., which temperature corresponds to that of the blood in the pancreatic vessels. The two flasks containing the organisms were examined daily for one week and twice during the second week. No alteration was observed in the bacteria of either test. The animals injected with the organisms died in both cases before the controls. The viscidity of the mixture, due to the glycerine, made it difficult to determine, even approximately, the quantity of bacilli injected, so that a large loop full of the control culture and the mixture in the flask was ground up and injected in similar quantities of the resulting emulsion. It seems that the effect upon the morphology and toxicity of the organisms by the pancreatic juice was nil. After two weeks extraction the mixtures

were freed of organisms (by filtration) and mixed with five times their bulk of distilled water. The three extracts (pancreatic juice which had been kept on ice, the pancreatic juice plus bile, and the plain pancreatic juice which had alone acted upon the bacilli), were then precipitated by ammonium sulphate and absolute alcohol, which threw down all the proteids. These were dissolved by a .5 per cent. solution of sodium chloride in as small a quantity as was possible to achieve that result. The proteids were principally peptones. The solution which had contained bile was dark, probably from extractives and bile salts. Equal quantities of this concentrated solution of proteids was injected intraperitoneally into guinea pigs, two being used in each set. One of each set died. The pig which received plain pancreatic juice proteids died in fifty days without pathologic lesion to account for death. The one dying after the injection with the proteids of pancreatic juice plus bile plus bacteria, and those of plain juice plus bacteria, died in thirty-seven days and thirty-four days respectively. Neither of these showed any pathologic lesion to account for death.

Human and bovine tubercle bacilli were introduced into fresh hog's bile in about the proportions of 1-10. Ten grams of ground up pancrease was mixed with 50 c. c. fresh normal bovine serum and 20 c. c. of hogs' bile.

In order to see if any different results could be obtained with ground pancreas, bile and organisms than with pancreatic juice, such a mixture was made. The results of observations on these three mixtures may be summed up together. Unfortunately, a shortage of animals prevented their injection, but the tinctorial reactions were followed carefully. It seemed that the bile has some slight effect upon the staining properties, because in the preparations from these three tests a wrinkling of the bacteria with irregularities of their wall and many deeply staining irregularities in their bodies were observed. They resemble organisms from a very old culture, which has become concentrated by evaporation. Experiments upon the tinctorial properties of dead tubercle bacilli of the same treatment gave similar results, however.

In order to see how easily the organisms would give off their wax to ether or chloroform after treatment by (1) glycerine pancreatic juice plus hogs bile, (2) glycerine pancreatic juice alone, (3) bile alone, the following tests were set: a small amount of the organisms from the various flasks was placed in tubes and boiled in ether and chloroform, separately, for two hours. A control tube of untreated tubercle bacilli was included. At the lapse of ten, thirty, fifty, and one hundred and twenty minutes, smears were made and stained all at the same time in the same manner. It was found by this test that the organisms which had been subjected to a mixture of pan-

crease and bile, or pancrease alone, gave up their wax more readily than when they had only been acted upon by bile. This was appreciable after ten minutes' boiling and marked at the lapse of thirty minutes. The chloroform was able to do this with much greater facility than the ether.

(12) **Fluid of Dixon.** This product differs from the last described (No. 11) chiefly in that it is made from living bacilli. The process is as follows: An equal weight of human and bovine tubercle bacilli removed from young cultures, mixed, dried to a paste in a dessicator, washed 6 hours with ether, the fat removed and weighed again. They are then suspended in .6 per cent. salt solution on the basis of 1 grm. of bacilli to 10 c. c. This suspension is shaken in a machine 8 hours and allowed to remain 16 hours at room temperature. The bacteria are then thoroughly separated by passing the fluid through a porcelain filter several times, the filtrate being the "Fluid of Dixon." (Medical News, Jan. 17, 1891.) It is a clear limpid pale straw colored liquid. At the end of the year, we had just begun our work on this product and cannot give any results. All that we can say at present is that single doses of .1, 1 and 3 c. c. of the pure fluid cause no fatal issue, nor does the animal seem to lose weight.

(13) **The Effect of Repeated Testing Doses of Tuberculin on Cows.** The occasional deaths among cows shortly following a tuberculin test, and the finding of focal necroses in the spleen of experimental guinea pigs treated with this and other toxins of the tubercle bacillus, led us to this experiment. The work so far has consisted in the injection of a healthy cow with 400 milligrams of old Tuberculin every two weeks for 6 doses. At post mortem, when the cow was killed, every organ was found normal. Study of the tissues is not completed.

(14) **Effect of Fresh Normal Bovine Serum on Tuberculosis in Guinea Pigs.** In order to see the effect upon guinea pigs and the course of tuberculosis in these animals influenced by repeated injections of fresh normal serum, pigs 233 to 240 were injected September 20 with a minute quantity of living tubercle bacilli. 233 and 234 were inoculated weekly beginning September 26 with .025 gm. bovine serum. 235 and 236 were begun October 10, 237 and 238 were begun October 28, 239 and 240 were allowed as controls. The evidences of tuberculosis in all these pigs were very inconspicuous, but in 233 and 234, which lived the longest, it was more marked than in the controls. 235 and 238 did not live long enough to get the full effect of the serum.

Pigs 241 to 244 were inoculated weekly with .025 gm. fresh normal bovine serum, and, after they had received six injections, were inoculated with 2 grm. Tubercle Bacilli. 241 died in three weeks of

extensive miliary tuberculosis. 242 died before the injection of organisms. 243 and 244 died three weeks after the injection of tubercle bacilli with miliary and caseous tuberculosis, and a few days before the controls. It would, therefore, seem that the fresh normal bovine serum did not have any protective affect upon guinea pigs by the production either of an active or passive immunity.

(15) **Presence of B. Coli Communis in Intestines of Fish.** The intestinal content of eight carp, seven catfish, four mud suckers, two trout, one perch, one sunfish, one crayfish, four tadpoles, and one frog were examined for the presence of B. coli. All these fish (twenty-nine in number) were caught near the mouth of the creeks at the Delaware Bay, a place at which the water is known to be polluted by sewage. The examination was made as soon as brought to the Laboratory, the same day or the day after the fish was caught. The technic consisted in washing the belly of the fish with sterile water, drying the surface of the skin with a clean towel, making an incision in the abdominal wall, and dissecting a portion of the intestines near the anus. The operation was done with sterile instruments and all aseptic precautions were taken. By gradually squeezing the cloaca between two fingers, the feces exuded and were collected in a sterile pipette and shake plates or stroke plates were made on litmus lactose agar. After twenty-four hours' incubation at 37 degrees C., the plates were examined and a number of the suspected pink colonies inoculated on dextrose bouillon in the fermentation tubes. The further procedure consisted in the reinoculation of the cultures which fermented dextrose on gelatine, milk and bouillon for the study of the biological characteristics of B. coli. Besides the usual tests, test No. 1, test No. 2 and test No. 3 were applied to all the cultures. The results are as follows: From the eight carp examined, two showed B. coli in the intestinal content. One catfish, two mud suckers, one crayfish and the frog gave similar results, while the rest did not show any B. coli. Beside the B. coli research, also study was made of the saccharolytic group of organisms, and this was found to be more abundantly present than the B. coli. The results show that 31 per cent. of the samples of feces did not give any suspicious colonies; 24 per cent. contained true B. coli, and 65 per cent. showed saccharolytic group or organisms.

PRELIMINARY REPORT ON THE EFFECT OF SERUM ON TUBERCLE BACILLI.

During my work on Tuberculosis, I have ever been impressed with the fact that the organisms causing this disease are well protected from that most potent bodily defense, the blood serum, while

exerting their pathogenic and pathologic influence. It has been taught that when the tubercle bacillus settles, it produces or calls forth tissue proliferation. In regard to that most unusual condition, chorionic tuberculosis, (Warthin, A. S., Journal of Infectious Diseases, June, 1907), this is most certainly not the case. Here a necrosis has been shown to occur followed by proliferation and later degeneration, the effect of these processes being to seclude the organisms in a mass almost impassible to the full serum. This same author reports disseminated necroses containing tubercle bacilli without tubercle formation, (Third Annual Report, Society for the Study and Prevention of Tuberculosis). This is occasionally observed in avian tuberculosis. We have seen lately the effect of resorption of injection of serum obtained by blistering tuberculosis patients, which according to reports is a beneficent one.

These facts have strengthened an idea which I have long had that serum would have an influence upon the tubercle bacillus in the animal body, if it but had a fair chance to act upon it for a sufficiently long period. My experimental idea was to see if normal serum acting upon the living and growing organisms could extract something from them which would induce an immunity either active or passive, more particularly the latter. It was further hoped that while the serum was acting upon the organisms, it would reduce their activity more than could be accounted for by their long life upon the same culture medium, this naturally reducing their virulence temporarily.

The bacteria used in the Laboratory are cultures which grow with moderate rapidity and will kill a guinea pig of 500 grams in six to eight weeks, if a normal dose be inserted or injected either under the skin or into the peritoneum. In making the serum extract as we shall call it, the bacteria were grown on solid media consisting of coagulated serum and veal glycerine agar and upon veal glycerine broth. The last is preferable for this work, because of the ease with which the first two become contaminated during the manipulation incident to applying the serum. To flasks of culture, both human and bovine four to six weeks of age, a volume of fresh normal bovine serum was added which was equal to the quantity of fluid within the flask upon which the organisms had grown. After thorough shaking, these mixtures were placed in the dark at 37 degrees C. The shaking was to break up the clumps of bacteria as far as possible, so as to permit a close action of the serum upon the bacteria. At first the mixture was allowed to extract one, two, seven and fourteen days, but the resulting fluid when filtered was found to have little effect on healthy or tuberculous animals, so that a longer extraction was employed, the time limit being set arbitrarily at two months. The serum extract used in these experiments was one of two months' duration.

At the expiration of the extraction time, the bacteria were filtered off, first by filter paper and then passing this filtrate through a porcelain bougie, the resulting filtrate being entirely free of bacteria. This effluent was diluted and used in 10 per cent. solution, doses in the following report being in terms of this dilution unless specifically mentioned. A preservative was not added, because of the precipitation caused thereby, and fear that it might vitiate the results. The bacillary residue was preserved and studied. Cultures made from the extraction flasks at the end of the extraction period proved them without contamination and the bacteria grew on transplants with the characters of the original culture. The serum used for this extraction and in the comparative experiments was obtained from healthy cows at our stable or from the abattoir.

In studying this serum extract, the following are the lines of work which received attention and which I will describe in detail.

1. The comparative toxicity of the extract and "a" fresh normal bovine serum, "b" serum the same age as the extract; "c" glycerine, "d" old tuberculin.

2. Effect on the temperature of healthy and tuberculous guinea pigs and cows. Tuberculin in comparison.

3. Ability of this extract to neutralize, devitalize or attenuate the tubercle bacilli, if allowed to remain in contact with them.

4. Effect of injecting the organisms into the peritoneum and the extract beneath the skin, and vice versa.

5. The ability of the extract to produce an immunity by repeated small injections.

6. The effect of the extract on guinea pigs already tuberculous.

7. The pathologic changes present in the experimental pigs.

8. The effect of the extraction on the bacteria themselves.

1. COMPARATIVE TOXICITY.

The various stock extracts differed a little in their killing power. In the first lot, a guinea pig of 300 grams would die within five days after an injection of 1 c. c. of the pure extract into the peritoneum. The remainder of the stock solutions would not kill in this time or dose, but were quite constant in killing in doses of 2 c. c. into the peritoneum. Injections of the same quantities under the skin, had the effect of reducing the weight of the animal, but rarely killed. The effect of fresh normal bovine serum and bovine serum of the same age as the extract was nil, the guinea pigs resisting it easily and the temperature of the cow remaining unaffected.

The comparative toxicity of serum extract, glycerine and old tuberculin is well illustrated by the following table, (I) giving the results of a single injection of the pure solutions under the skin,

where as said above, the effects are much slower. Indeed animals will readily withstand doses under the skin which would be rapidly fatal if given into the peritoneum.

CHART I.

Dose.		Old Tuberculin.	Extract.	Glycerine Diluted.
100 mg., ...	Length of life, ..	Living, ...	39 days n, ...	Lived.
200 mg., ...	Length of life, ..	Living, ...	36 days n, ...	16 days.
500 mg., ...	Length of life, ..	39 days n., ...	38 days n, ...	10 days.
1 grm., ...	Length of life, ..	39 days n., ...	38 days n, ...	10 days.
5 grm., ...	Length of life, ..	1 day, ...	20 days, ...	.....

These results are slightly ambiguous, for we have all the guinea pigs dying after the injections of extract, while those injected with smaller doses of old tuberculin still live; again we have the five gram dose of the latter killing in one day, and twenty days being required for the same dose of the extract to kill. The extreme toxicity of this large dose of tuberculin is, without doubt, due to its large content of glycerine. The extracts and tuberculin have some relation pathologically, to be mentioned later. These solutions, when large in amount, were distributed as evenly as posssible in the subcutaneous tissue. The serum extract is apparently more toxic than the same dose of tuberculin, but not so much as similar doses of glycerine. The extract is, however, much more toxic than plain serum whether fresh or old.

2. THE EFFECT ON TEMPERATURE.

If healthy guinea pigs were injected with extract beneath the skin, there was uniformly a rise of temperature averaging .4 degrees F. When the injection was made into the peritoneum, the temperature was quite irregular in degree and time of appearance, sometimes there being no effect, at others only a slight fall. Injections of small doses of tuberculin into healthy pigs, were followed by no result when the injections were subcutaneous, while the temperature was very irregular and indefinite when the solution was given into the peritoneum. The results when the injection was made by the latter route were practically the same with both solutions.

If the injections were made into the tuberculous guinea pigs, the reaction was specific with tuberculin within six hours, the rise of temperature averaging 1 degree F. The reaction appeared two hours after the injection of a similar dose of serum extract, was irregular and averaged .6 degree. These pigs had been injected five weeks before with about 1-40 mg. of bovine tubercle baccilli and when tested received the same dose of extract or tuberculin (.5 mg.) under the skin. The controls behave as normal guinea pigs, described above. (For the effects on cows see the latter part of paper.)

3. THE EFFECT OF SERUM EXTRACT ON TUBERCLE BACILLI.

Tubercle bacilli used to make this test were five weeks old bovine cultures. They were dried at incubator temperature in a weighing dish, weighed, mashed and 1 c. c of pure extract added for every .5 mg. of organisms. At the end of various periods a stable dose of 1 c. c. was removed, washed in salt solution to free it of serum, centrifuged and the bacteria injected into the peritoneum of a guinea pig. The following chart (II) gives the result graphically and shows the failure of the extract to neutralize or attenuate the bacteria in any way.

CHART II.

	Inj.	Died.	Result.
Control for organisms,	2-22	3- 8	Early miliary tuberculosis.
Control for Extract,	2-22	.....	Living.
Organisms Serum Extract immediately,	2-22	3- 8	Early miliary.
	2-22	4-29	Caseous mil. T.Bc. of peritoneal cavity.
Organisms after 12 hours,	2-23	3-11	Caseous mil. T.Bc.
	2-23	3-18	Gen. caseous mil. T.Bc.
Organisms after 24 hours,	2-24	4- 8	General caseous T.Bc.
	2-24	3-18	Caseous mil. T.Bc.
Organisms after 1 week,	3- 1	4-10	General caseous T.Bc.
	3- 1	3-14	General miliary T.Bc.

4. THE EFFECT OF VARIOUS ROUTES OF INJECTION.

The result of experimentation upon differences which might arise after variously putting the extract into the peritoneum and the bacteria under the skin and vice versa was rather surprising. It was rather uniformly the case that when guinea pigs received extract into the peritoneum and the bacilli under the skin, the tuberculosis developed very slowly and in one set of experiments was limited to the site of inoculation and neighboring lymph glands. On the other hand, when the serum was put under the skin, which by the way was the rule in our experiments especially during attempts at immunization, the disease developed very quickly and followed the usual type seen in this experimental work. Although this experimental influence of the serum when put into the abdomen occurred twice, once quite pronouncedly, a sound reason for it could not be found inasmuch as other work with the serum has failed to show a localizing ability. This experiment is being tried again; injections of .1 to 1. mg. bovine three to six weeks tubercle bacilli were made into the peritoneum of guinea pigs and repeated subcutaneous injections of extract, (doses .025 c. c.=.0025 grm.) for the purpose of immunization did not have the desired effect in most of the cases, the process seeming to be hastened rather than retarded by the serum injections.

5. EFFORTS AT ACTIVE IMMUNIZATION.

The effect of repeated small injections of serum extract into guinea pigs, to produce an active immunity, has been pursued attentively. Several sets of animals have been carried along for

some time with monthly injections of .05 and .025 c. c. of the solution. Two pigs in one set gained seventy-five and one hundred grams respectively. When these pigs were injected with 1. mg. tubercle bacilli, however, they died almost as soon as the control, two in one set dying several days before. The control for the serum still lives and continues to gain in weight. The result of one set is shown in the accompanying chart. All these injections were made beneath the skin, consisting of .05 c. c.

CHART III.

No. P.	With What Inj.	No. time.	Weight change.	Length of Life After Inj. of T. Bc.	Result.
58	Serum Extract, ...	6	+70 Gms.	Not inj. T. Bc., ...	Living control.
251	T.Bc., ...	1	—15	22 days, ...	Caseous T.Bc. Control.
125	Serum Extract, ...	5	+75	27 days, ...	General caseous.
137	Serum Extract, ...	6	—60	22 days, ...	General caseous.
e	Tuberculin, ...	4	—20	20 days, ...	General miliary.
		4	+10	10 days, ...	Localized caseous.

It may be seen from this chart (III) that the repeated injection of extract into guinea pigs before inoculating them with bacteria, has no effect in delaying the progress of tuberculosis, nor does it modify its form to any material extent. Some mention of the microscopic appearance of the liver and spleen will be made later on.

THE EFFECT ON TUBERCULOUS GUINEA PIGS.

In this experimentation, the effect of introducing the extract after the tubercle bacillus, is more pronounced than in the former heading. The appended chart (IV) will give examples of this influence. It will be noted that the average length of life is much longer than described in the previous heading, and for the controls. The dosage of tubercle bacilli must be taken into consideration in this experiment, however, for under heading No. 5, represented by the last chart, 1. mg. was injected. The reason for introducing only half that quantity in this case, was that after the animals were tuberculous, they would be subjected to repeated handling and wounds incident to the injection of the extract while they were sick. The controls received exactly the same quantity of tubercle bacilli and were handled at the time of injection of the others.

The primary tests with extract alone were done first, the facts concerning control experimentation with tuberculin afterward and not being complete, the results are omitted at this time.

CHART IV.

No.	Date T.Bc. inj.	No. Extract injected.	Weight change.	Length of life.	Result.
92	3-15, .5 mg.,	18. .05 c. c.	+190 grs.,	14 mos., ...	General caseous tuberculosis.
82	3-1, .5 mg.,	0	.....	24 days, ...	Early cas. gen.
81	3-1, .5 mg.,	2. .05 c. c.	—10 gm.,	7 weeks, ...	Slight infiltration at site of inoculation.
80	3-1, .5 mg.,	2. .05 c. c.	—5 gms.,	7 weeks, ...	Slight infiltration at site of inoculation.
78	3-1, .5 mg.,	3. .05 c. c.	—100 gms.,	.....	Still living.
112	4-30, .5 mg.,	2. .05 c. c.	+60 gms.,	6 weeks, ...	General caseous.
113	4-30, .5 mg.,	2. .05 c. c.	+40 gms.,	6 weeks, ...	General caseous.
116	4-30, .5 mg.,	2. .05 c. c.	—60 gms.,	7 weeks, ...	Caseous miliary.
118	4-30, .5 mg.,	0	.....	12 days, ...	Caseous miliary.
120	4-30, .5 mg.,	1. .05 c. c.	—10 gms.,	9 weeks, ...	General cas. mil.
121	4-30, .5 mg.,	3. .05 c. c.	+15 gms.,	13 weeks,....	General caseous.

The above chart shows, I think a slight effect upon the resistence of the animal to the tubercle bacilli called forth by the extract injection, but probably not more than would be expected from a similar treatment with tuberculin. We have two pigs which have been injected six times during nine months; these will be immunized for one year and then killed.

7. PATHOLOGICAL CHANGES.

The pathological lesions which are produced by injections of serum extracts are not peculiar to this substance. In the first chart, I would call attention at this point to a small letter "n" beside the animals which received 500 mgs. and 1gram of tuberculin and 100 mgs., 200 mgs., 500 mgs. and 1 gram of extract. This means that in the spleens of these animals small nodules were found which microscopically proved to be focal necroses. These necroses were occaionlly found also in the liver but in none of the other organs. There was no microscopical lymphatic hyperplasia in the bodies of guinea pigs dying after injection and very little could be found by miscroscopical preparations. These focal necroses of the spleen find no counterpart in the regional lymph nodes through which the injected material must have passed. Occasionally accumulations of polymorphonuclear and endothelial cells were found around these focal necroses of the spleen, but not in every instance. The number of these latter collections in a given spleen seemed directly in proportion to the length of time which had elapsed between the last injection and death. This would seem to be an early stage of encapsulation or the evidence of the casting off of the slough formed by this focal necrosis. General congestion was present in almost all pigs which died within the first few days following the inoculation, but occasionally a few petechial hemorrhages were observed in the serous membranes, especially in the region of the spleen and kidney. This latter observation could also be made in the bodies of pigs dying after tuberculin injection.

The appearance of the liver and spleen of guinea pigs dying after several injections of extract which either preceded or followed the inoculation of bacteria, deserves mention. The caseated infiltrate was of a pale, tawny yellow, contrasted with the red brown of the liver or spleen. This mass was often no more friable than the organ tissue itself. It was strictly an infiltrate, no line of demarcation existing to show where an exudation began or was limited. Here and there in the rest of the organ, there would be a large cheesy nodular tubercle. The miliary forms did not vary from the usual acute disseminated type.

8. EFFECT UPON BACTERIA.

The effect of the serum extraction upon the bacteria themselves was of importance and received our attention in the direction of morphologic change and attenuation. After removal from the extracted mixture and washing, the organisms were slightly shrunken and took the stain with a trifle more irregularity than active growing bacteria. Differences between them and cultures of their same age, were impossible to detect if the smears were stained side by side on the same slide. They grew with the usual charateristics upon the same culture. The virulence was somewhat lower than control cultures of the same age, for when injected in approximately the same doses (not accurately weighed because of serum coagulum around them) it required almost twice as long for the extracted bacteria to kill animals of about the same weight. This occurred in two out of three experiments; the other test resulting in the death of the two sets at about the same time. If these extracted organisms were killed and other untreated cultures of the same age were killed, and these two masses injected into separate sets of guinea pigs, they both produced the same pathologic change, that is an infiltrated encapsulated cheesy mass at the site of inoculation.

EXPERIMENT ON COWS.

Intravenous injections of 10 cubic centimeters of the extract into healthy cows produced a temperature reaction of about 1 degree F. during the succeeding twenty-four hours. If the animals were tuberculous, the temperature change usually consisted in a depression of .2-.6 degree F. Following injections of tuberculin in the same dose into the vein of healthy animals, nothing more than an irregularity of temperature was observed, which in the case of tuberculous animals was more marked. No true tuberculin reaction was ever obtained after such a test. The subcutaneous inoculation of tuberculin into infected animals was of course specific. Injections of serum extract under the skin of healthy animals led to no rise in temperature. Subcutaneous injections into infected cows gave rise

to reactions almost as definite as those following tuberculin, when used in the same dose. Reactions could be obtained when using as low as 100 milligrams, but not lower.

After these facts were determined, one healthy and two tuberculous cows received monthly injections of 500 milligrams of serum extract beneath the skin, from May to December, 1907. They were again tested, first with tuberculin and then with serum extract. The reactions were almost exactly the same as upon their first test. It therefore seems that the serum extract injections did not produce a complete encapsulation of the foci in the infected animals, but that antituberculin was still being formed from some area. Repeated injections of this extract produced no temperature susceptibility in healthy animals.

With the hope of employing whatever anti-bacterial substance might be present in the body fluid after interaction of bacteria, tissue and toxin, following an injection of tuberculin, a cow was given double the testing dose of tuberculin. At the time which we believed to be the highest point of the temperature curve, the animal was bled, the serum separated and used to extract tubercle as described in the introduction. The resulting extract was then injected into the vein of healthy and tuberculous cows (10 cubic centimeters) the first animal having a rise of temperature of .8 degree F. within twelve hours, the temperature of the tuberculous animal remaining unchanged. This is exactly the same as the result of one previous injection in the same animal, of extract made from the serum of a healthy cow.

The preceding experiments on the effect of normal bovine serum on the tubercle bacillus and on the resulting extracts, seem to justify the following conclusions:

1. That the resulting extract is toxic, probably due in part to its serum content.

2. That the serum extract produces a temperature reaction in healthy animals, when given into the vein or peritoneum.

3. That it seems to produce a temperature reaction in tuberculous animals specific for itself.

4. That this extract has no power to destroy, neutralize or attenuate tubercle bacilli.

5. That repeated injections do not produce an active immunity.

(Note).—Normal serum extraction of degreased tubercle bacilli was tried once. The resulting filtrate had exactly the same effect upon guinea pigs as some of the same stock of serum used for making it and therefore ten weeks old. This has not been repeated, because of the first failure and because it seems improbable that serum would extract anything from the organisms after they had been treated with alcohol-ether, in removing the wax and washing with salt solution.

6. That whatever effect the serum extract may have in antagonizing the development of tuberculosis is best shown by injecting it after the tubercle bacilli and putting it into the abdomen of guinea pigs.

7. That injections of serum extract produce non-specific focal necroses in the spleen and sometimes in the liver.

8. That the bacteria are little if at all injured by exposure to the serum.

9. That an anti-toxic body cannot be obtained by extracting the tubercle bacillus with normal bovine serum in this manner.

MAY DRINKING WATER, WHEN POLLUTED WITH SEWAGE, BE ONE MEDIUM OF DISSEMINATION OF THE TUBERCLE BACILLUS?

The tubercle bacillus may be introduced into the animal economy in various ways. The usual portals of entry are the mouth, nose, or an abraded surface. In cows it may obtain entrance also through a milk duct or by way of the vagina. That it sometimes enters the foetus in utero through the medium of the circulation must be admitted notwithstanding the opinion of many physicians to the contrary. Veterinarians tell us that it is not uncommon for cows to drop infected calves. This of course is entirely apart from the so-called inherited predisposition to tuberculosis in man which may be either physiological, consisting of such a condition of the tissues and more especially of the mucous membranes as will afford a receptive and favorable environment for the growth of the organism; or anatomical, depending on a conformation of the thorax such as the deformities known as chicken breast, winged chest or hollow chest, which interfere with the full and healthy development of the lungs. It may of course be introduced artificially by inoculation as demonstrated upon the lower animals. When it enters by the mouth and nose, it may as dust pass directly into the air passages and lungs, or being detained in the mouth, be swallowed with the saliva and so reach the digestive tract. Contained in food or drink, it may pass directly into the stomach and intestines.

It has been definitely proven that it may penetrate the healthy mucous membrane of the intestinal tube, pass into the lymphatic circulation without leaving the slightest lesion or trace of its passage, find its way into the thoracic duct, so into the general circulation and finally into the lungs. So that its presence in the lung, coincident with its absence in the intestinal wall, does not at all prove that it was not originally introduced in food or drink.

The early tubercular affections of infancy, meningitis and tabes mesenterica, are generally due to the use of infected milk or artificial feeding.

These considerations prepare us for the question whether in view of the thousands of human beings who are expectorating tuberculous matter and depositing it with their urine and feces, great numbers of these bacilli must not find their way into our streams and constitute a source of pollution of our drinking water in many instances.

Particularly pertinent is this inquiry as regards the opportunity for dairy cattle if they drink from streams close to the source of pollution, becoming infected themselves and conveying the infection to their milk. Any one who has watched cattle drinking in a stream can readily understand how this might occur. Even when they do not wade in to a sufficient depth to immerse their teats and udders, in their efforts to drive away flies they throw the water dripping from their mouths and from the ends of their tails over their sides and udders. From the stream they usually go direct to the milking. With the carelessness which prevails on the average farm, the milker finds no difficulty in mixing the milk which is distributed over the outside of the teats with any organic filth which may be clinging to them, as well as to his own hands, and allowing it, so contaminated, to drop into the milk pail.

In order to remove this hypothesis of the possible contamination of water supplies from the realms of mere theory and place it upon a substantial basis, I have been conducting a series of experiments, with the co-operation of Dr. Herbert Fox, Chief of the Laboratories to determine whether tubercle bacilli may be found in sewage, and if so, to what extent. The pollution of water supplies by the organisms of typhoid fever, of dysentery, of cholera and of diarrhoea has been so evident and of such constant occurrence that it has filled our field of vision to the exclusion of the possibilities of such pollution by the poisons of other diseases. Tuberculosis is one which has been thus overlooked. I know of no investigations having been made or published in order to determine the facts in this matter up to the present time.

So far my researches have been limited to the examination of the sewage from the "Rush Hospital for Consumption and Allied Diseases," West Philadelphia, the sewage from the White Haven Sanatorium for Consumptives, and the mixed sewage from the sewer outlet at South Street Bridge, West Philadelphia.

The sewage from the main outlet into the sewer from the Rush Hospital, taken November 24th, 1907, was largely fluid, containing some solid fecal matter, and what was apparently refuse from the kitchen.

The sample was well shaken, the solid portions broken up with a rod and portions of 1, 2.5, 5 and 10 and 20 cubic centimeters pipetted into centrifuge tubes, the first four being made equal to the bulk of the last one, with sterile water. These tubes were centrifuged for eleven hours, with one intermission to remove the supernatant liquid, and add fresh sterile water to them. After centrifugation, the solid sediment was spread on glass slides, using the entire 1 cubic centimeter at the bottom of each tube. These slides were stained with Ziehl-Nielson Carbol Fuchsin for five minutes and one set was decolorized and counter-stained with a saturated solution of methylene blue in absolute alcohol, and another was first decolorized with a 25 per cent. solution of sulphuric acid in absolute alcohol and couter stained with Loeffler's, while a third was decolorized and counter-stained by Pappenheim's solution. This last method was used to corroborate the findings of one set of Rush sewage, and the samples from White Haven. In every instance that tubercle bacilli were found in smears decolorized by the 25 per cent. sulphuric acid in absolute alcohol, they were also found on preparations treated with the Pappenheim solution. This method is declared as a final tinctorial test by Pappenheim, (Berliner Klinische Wochenschrift, 1898, No. 37), Simon, (Clinical Diagnosis 1904) and Rosenberger (as yet unpublished).

Every side was subjected to the search of an hour under a 1-12 oil immersion Zeiss with No. 6 compensation ocular. The following counts are given upon the methods in which the slides are decolorized by the sulphuric acid alcohol method, because of the clearness of the field.

One undoubted tubercle bacillus was found on the slide containing the sediment of 1 cubic centimeter; 2½ cubic centimeters showed three tubercle bacilli; 5 cubic centimeters showed seven tubercle bacilli; 10 cubic centimeters showed ten, and tubercle bacilli were found to be present in the centifuged portion of 20 cubic centimeters, but their number was not counted. All these figures represent the search of one hour each with a mechanical stage.

On December 17th another sample was taken at the same place. In this sample the result was practically the same at that above outlined. The number of organisms demonstrable in the slides made by identical methods was found to decrease appreciably when the sewage was kept under artificial conditions, i. e. in large dark bottles in the ice box.

Length of Time.	Immed.	1 Week.	2 Weeks.	4 Weeks.
No. organisms, average of 3, ...	1 c.c. 1	1	0	0
	5 c.c. 6	3	1	1
	10 c.c. 8	+	2	1
	20 c.c.+	6	2	2

Samples were taken January 4, 1907, of the sewage from the bactericidal filter plant of the White Haven Sanatorium for Consumptives. Portions were taken from the mixed sewage, from the solid sediment after filtration and the effluent. The samples were treated exactly the same as outlined for the sewage at the Rush Hospital, and equal volumes taken. The counts by the sulphuric acid alcohol method and the preparations decolorized and counter stained by the Pappenheim solution, are practically identical. The counts are given according to the sulphuric acid alcohol method for the reason above mentioned.

In the stained sediment from 1 cubic centimeter and 5 cubic centimeters of the mixed sewage, no tubercle bacilli were found, but they were found sparsely when the sediment of 10 cubic centimeters was stained. This sediment stained so diffusely with methylene blue that it was practically impossible to see all fields clearly, and some may have been overlooked. The solid sediment was removed from one of the chambers 18 inches below the surface, as far down as was possible to reach. It was a dark, foul smelling mass, about the consistency of feces, and not dry as far down as could be seen. The mass was macerated with an equal quantity of sterile water, well mixed with the rod and portions centrifuged. The sediment of 1 cubic centimeter of this mixture showed two tubercle bacilli after an hour's search. The effluent from this filter plant was taken directly into the bottle as it bubbled out of the ground about 200 feet down hill from the separation chamber. It was a turbid fluid and showed a bacterial count of 370,000. Typical acid fast bacilli could be demonstrated in quantities of 10 cubic centimeters after the search of one-half hour. They were in clumps and not easily enumerated. The sediment of smaller quantities failed to show any such organisms.

The sewage from the Schuylkill river was taken at the mouth of the sewer below South Street Bridge, West Philadelphia. 150 cubic centimeters were centrifugated for twelve hours, the sediment thoroughly mixed from the several centrifugation tubes, re-centrifuged and dried in the hot air oven, softened with normal salt solution, again centrifuged, the supernatent liquid poured off, dried again in the hot air oven, softened with salt solution and spread on four glass slides for staining purposes. The reason for these several washings was the presence of a scum or coating over the sediment when dried after the first centrifugation. No organisms in any way comparable to the bacillus tuberculosis could be found. In preparations decolorized by 5 per cent. hydrochloric acid no acid fast organisms were found; this was done to see if the smegma bacillus was present in the sewage. There were no masses of dejecta but the fluid had a distinct fecal odor.

The experimental efforts at producing tuberculosis in guinea pigs have been omitted up to this point because they can be treated together; their results being uniformly negative. The sediment in the several instances directly after centrifugation, was subjected to temperatures of 60 degrees, 65 degrees, and 70 degrees C. for fifteen, seven and two minutes respectively with the hopes of killing off the sewage organisms, particularly the spore formers, without doing any damage to the tubercle bacilli. Guinea pigs injected with this heated sediment either succumbed shortly after the inoculation or when they survived this, failed to show any pathologic lesion of tuberculosis. In order to have the organisms in their vegative state, sediment from a large amount of sewage was incubated at 35 degrees C. for twenty hours, centrifuged for a few minutes and this sediment subjected to heat as above outlined. The second centrifugalization was only done long enough (circa twenty minutes) to throw down a sufficient sediment with which to work, a complete sedimentation requiring so long as to permit further spore formation. The results of inoculation into guinea pigs were also negative. In smears made from some of the injection material, the typical acid fast organisms were found but they could not be discovered in smears made from the peritoneum or organs of pigs dying shortly after injection.

This does not prove that the acid fast bacilli were not tubercle bacilli. The discovery by stain of tubercle bacilli in sewage does not prove they were viable. When taken direct from the sewer of the Rush Hospital and White Haven Sanatorium, it is assumable that they still live when so recently from the human body. The fact that no tuberculosis was produced does not militate against our assumption of the identity of these acid fast organisms, because of the few that were introduced, inasmuch as we are obliged to use small quantities of the sediment to lessen the action of the accompanying germs which we could not kill or remove. Attempts at cultivation with pieces of organs and coagulated blood serum were of course failures.

EXPERIMENTAL WORK UPON THE VIABILITY OF TUBERCLE BACILLI AND SEWAGE ORGANISMS.

At the outset of this work some hope was placed in the effect of sunlight upon the sewage organisms. Later eosin with its well known bactericidal activity was added to our means of removing the contaminating bacteria. Early in our experimentation the effect of sunlight upon tubercle bacilli smeared and dried upon filter paper was determined. Direct sunlight upon these papers was sufficient to kill the tubercle bacilli in twelve minutes, (Spring of 1907, April). The bacteria-bearing paper strips were exposed in open Petri dishes, and then transferred to tubes of glycerine veal agar upon which the

stock was growing well at that time. In July and October 1907, experiments upon the effect of sunlight and eosin upon the surface growths in flasks were made. The experiment was set as follows: one set of flasks was kept as control, one set was used as control and exposed to the sunlight; to one set of flasks was added, 0.03 per cent. eosin solution and on the surface of the third set a 2 per cent. eosin in gelatine was smeared in as thin a film as possible. While I am aware that this procedure is not satisfactory to determine the lethal sunlight exposure, it was hoped that some assistance might be given toward determining what would happen tubercle bacilli in a thin layer of emulsified sewage sediment exposed in these flasks. The possibility of error in this technic is manifest. It is striking, however, that the transplants from the sets which were exposed in flasks smeared on the outside with eosin, did not grow after one hour exposure although the two tests were made when the sun's power is quite different, July and October. Chart of this test:

		Control.	½ hr.	1 hr.	2 hrs.	4 hrs.	8 hrs.
8-19	Control dark,	+	+	.....	.....	.....	.....
	Control without Eosin,	+	+	−	+	+	+?
	Eosin in solution 0.03 per cent.,	+	+	+	+	+	−
	Eosin smeared on surface,	+	+	−	−	−	−
10-1	Control dark,	+	.....	.....	.....	.....	.....
	Control without Eosin,	+	+	+	+	+	−
	Eosin in solution 0.03 per cent.,	+	+	+	+	−	−
	Eosin smeared on surface,	+	+	−	−	−	−

It appears from this that the photodynamic power of eosin is effective after one-half hour or one hour at least, upon tubercle bacilli. It restrains growth after transplantation at any rate.

In making a control experiment with sewage, a fresh positive Rush Hospital sewage was rapidly centrifuged and the sediment allowed to germinate twenty-hours in 90 per cent. by bulk of bouillon. This was again rapidly centrifuged and a thick emulsion of the sediment placed in our usual tubercle bacilli flasks to the depth of about two millimeters. These were placed in lots like the last experiment, one set as control, one received 0.03 per cent. eosin and the third had a gelatine coating of eosin. The results of their growth after direct sun exposure on a very bright day, (although December 14th, 1907), require no chart. Transplants made with a loop and with the extreme point of a straight needle, touching only the surface, gave marked positive growths of contaminating organisms after four hours.

The results of exposing dried sewage on filter paper was done with the tubercle bacilli was likewise disappointing. The germinated sewage was rapidly sedimented, this mass ground up to a state

approaching perfect homogeneity. It was then distributed by a pipette in equal quantities on slips of filter paper which were placed in a vacuum dessicator without acid for ten minutes, at the lapse of which they were still a little damp. The exposure to the sun was made in two minutes after removal from the dessicator. The time elapsing from removal from the incubator to the sun exposure being about forty minutes. The slips were then exposed directly to the sun for one, two, five, ten, thirty and sixty minutes, and transplanted to neutral bouillon. Every exposure grew well.

It is evident from these few sun light and eosin tests that longer exposure is required to kill the sewage organisms than would suffice to restrain growth of the tubercle bacilli, therefore rendering this technic impracticable.

We are dealing with such a small number of organisms in this sewage compared to the number usually employed to produce artificial lesions that some means must be found to render sewage organisms entirely innocuous, which means must be such as will not harm the tubercle bacillus itself. We are still working on this problem but cannot as yet report much progress. The finding of tubercle bacilli in smears made from sedimented sewage of Tuberculosis Hospitals, by eminently trustworthy methods, is sufficient proof to us that these organisms are present in such sewage and can therefore be in the water courses into which the sewage flows.

THE REACTION OF THE PHAGOCYTES OF ELEPHANT'S BLOOD ON THE BACILLI OF TUBERCULOSIS.

In casting about for an animal whose blood might be availed of in conducting experiments on immunity against tuberculosis, it occurred to me that the elephant possessed two characteristics which might make it useful for this purpose: First, its remarkable longevity, suggesting a power of resistance to all infections, whether of human beings or of the lower animals; and second, the fact that no records could be found of the observation of tuberculosis in this race.

With the skilful co-operation of Dr. Fox, the following observations were undertaken. By the courteous permission of the Zoological Society of Philadelphia, a small quantity of blood was obtained from an elephant's tail. At the same time experiments were made with the blood of the human being, the cow, and the guinea pig. The conditions in each case were identical. The leukocytes were twice washed and the emulsion of tubercle bacilli was prepared by washing lightly with alcohol and ether and rubbing up in a mortar in 0.86 per cent. salt solution and then treating with the centrifuge. The turbidity of the emulsion corresponded to No. 2 of a barium sulphate nephelometer (Table I). A second experi-

ment was made in which the emulsion was produced by boiling in chloroform, the object being to get a suspension which will keep indefinitely and may always be rendered homogeneous by shaking. Four salt solutions of different strengths were used for the purpose of testing spontaneous phagocytosis.

In both experiments the blood of the same individual was used, the bacteria for different emulsions were obtained from the same tuberculous strain, and the turbidity was identical. In the second the whole blood method was employed, using homologous cells and serum. Table II shows the phagocytic capacity of the blood of the same person on four successive days, the last time on that of the second elephant test.

Table I.—Comparative Phagocytosis of Human, Bovine, and Rodent Blood with Bacillus Tuberculosis.

	Phagocytic Index.	Average.
0.1 c.c. elephant's serum plus 0.1 c.c. elephant's leukocytes plus 2 c.c. bacteria emulsion,	1.0	0.40
0.1 c.c. elephant's serum plus 0.1 c.c. guinea-pig's leukocytes plus 2 c.c. bacteria emulsion,	0.7	0.28
0.1 c.c. elephant's serum plus 0.1 c.c. emulsion human leukocytes plus 2 c.c. bacteria emulsion,	0.4	0.16
0.1 c.c. elephant's serum plus 0.1 c.c. emulsion cow's leukocytes plus 2 c.c. bacteria emulsion,	0.3	0.12
0.1 c.c. cow's serum plus 0.1 c.c. emulsion cow's leukocytes plus 2 c.c. bacteria emulsion,	1.0	0.28
0.1 c.c. cow's serum plus 0.1 c.c. emulsion human leukocytes plus 2 c.c. bacteria emulsion,	0.57	0.16
0.1 c.c. cow's serum plus 0.1 c.c. elephant's leukocytes emulsion plus 2 c.c. bacteria emulsion,	0.43	0.12
0.1 c.c. cow's serum plus 0.1 c.c. emulsion guinea-pig's leukocytes plus 2 c.c. bacteria emulsion,	0.43	0.12
0.1 c.c. human serum plus 0.1 c.c. human leukocytes plus 2 c.c. bacteria emulsion,	1.0	0.24
0.1 c.c. human serum 0.1 c.c. emulsion cow's leukocytes plus 2 c.c. bacteria emulsion,	0.83	0.20
0.1 c.c. human serum plus 0.1 c.c. emulsion elephant's leukocytes plus 2 c.c. bacteria emulsion,	0.5	0.12
0.1 c.c. human serum plus 0.1 c.c. guinea-pig's leukocytes plus 2 c.c. bacteria emulsion,	0.33	0.08
0.1 c. c. guinea-pig's serum plus 0.1 c.c. guinea-pig's leukocytes plus 2 c.c. bacteria emulsion,	1.0	0.28
0.1 c.c. guinea-pig's serum plus 0.1 c.c. emulsion human leukocytes plus 2 c.c. bacteria emulsion,	0.85	0.24
0.1 c.c. guinea-pig's serum plus 0.1 c.c. emulsion elephant's leukocytes plus 2 c.c. bacteria emulsion,	0.57	0.16
0.1 c.c. guinea-pig's serum plus 0.1 c.c. cow's leukocytes emulsion, plus 2 c.c. bacteria emulsion,	0.4	0.12

One-half hour at 37° C. 100 cells counted.

Table II.—Average Phagocytosis of Human and Elephant's Blood with Bacillus Tuberculosis.

	Human—March 29, 1907.	Human—March 30.	Human—April 1.	Human—April 2.	Elephant—April 2.
Emulsion made in Na Cl solution of					
0.1 per cent.,	0.46	0.42	0.28	0.30	0.36
0.6 per cent.,	0.36	0.28	0.30	0.34	0.34
0.86 per cent.,	0.28	0.32	0.24	0.32	0.48
1.5 per cent.,	0.32	0.40	0.44	0.38	0.46

The results of these experiments may be summed up as follows:

1. The expectation that the leukocytes of elephants' blood might possess a high degree of phagocytic energy as far as the tubercle bacilli is concerned was not fulfilled to such a degree as to promise any practical results, being but a trifle higher than that of human cells.

2. The highest phagocytic average is obtained when the leukocytes and cells of the same animal or race are employed.

3. When the serum of the various animals is mixed with the leukocytes of other animals, the results vary very much, in accordance with the order in which the mixture is made. For example, when elephant serum is added to guinea pig leukocytes, the index resulting is only 0.7, but if the guinea pig serum is added to elephant's leukocytes, the index mounts to 0.85. If bovine serum is added to human leukocytes, we obtain an index of 0.57, but if human serum is mixed with bovine leukocytes, it reaches 0.83.

4. It seems to make very little difference numerically in the phagocytosis of tubercle bacilli whether they are emulsified by rubbing in a mortar with salt solution or by boiling in chloroform.

COMPARATIVE VALUE OF LIQ. CRESOLIS COMPOSITUS, U. S. P. AND CARBOLIC ACID AS GERMICIDES.

The new germicide Liquor Cresolis Compositus, lately recommended by the United States Pharmacopoeia, has gained considerable notice since the publication of an article by C. N. McBryde (U. S. Department of Agriculture, Bureau of Animal Industry Bulletin No. 100) upon its germicidal effect and the parts taken by the different cresols in the commercial article which have different distilling points. The following work was undertaken by Dr. Fox, to determine the efficiency of this new solution and its practical value for hygenic purposes. As in Dr. McBryde's work, carbolic acid was

used as a comparison. The carbolic lime mixture was discovered by the writer about a year ago to have distinctly lower bactericidal powers than carbolic acid alone.

In preparing Liquor Cresols Compositus the exact formula as given by the United States Pharmacopoeia was followed most carefully. Quoted for reference.

Cresol,	500 gms.
Linseed oil,	350 gms.
Potassium Hydroxid,	80 gms.
Water sufficient to make,	1,000 gms.

Dissolve the potassium hydroxid in fifty gms. of water in a tared dish, add the linseed oil and mix thoroughly. Then add the cresol and stir until a clear solution is produced, finally add sufficient water to make the finished product weigh 1,000 gms.

Two samples of commercial cresols were obtained from different local chemists, and the two compositions were made by my assistant and myself side by side, the same kind of clean apparatus being used in a similar manner by both us. One of the resulting solutions was darker than the other (Cresol No. 1 was darker than No. 2). The darker proved to be a trifle less efficient in regard to its germicidal activity. They had no differing behavior in regard to saponification, clear solutions being obtained from both in making dilutions for the experimentation. Separation did not occur in any dilution with either composition when in dilutions of less than ten per cent. No distillation of the germicide was made as our object was the practical application rather than the analytical separation of the essential principals. Strong solutions made clearer mixtures than weaker ones.

In this work, the effects of Phenol and Liquor Cresolis Compositus U. S. P. were tried in dilutions of 1-50, 1-100, 1-200 and 1-300 on Micrococcus pyogenes aureus, (twenty-four hours broth culture) Bac. coli com., (twenty-four hours broth culture) and Bact. anthracis, (fourteen day broth culture). The results may be seen on Charts Nos. 1-4 inclusive.

The following is the outline of the technique used. Inasmuch as the Cresol solution was weighed in making, dilutions of it were made by weight and the Phenol was weighed in the chrystal form before dissolving. The "drop method" was used entirely. It was, however, not truly the drop method, but instead a quantity of .2 c. c. of the respective culture was allowed to fall directly into the diluted germicide in the test tube, which was always the same in quantity, 5 c. c. Larger tubes were used to hold the germicide during exposure so that the four per cent. of culture could be added and mixed without spreading over the sides of the tube to a great height, thereby possibly allowing some bacteria to escape by drying.

Two standard loopfuls were transferred from the germicide-bacterial emulsion to a tube of freshly made neutral beef peptone broth. These tubes of broth average 8 c. c. The time limits may be seen by inspecting Chart 1. Sub-cultures were kept a week at thirty-five degrees C. when readings were made. Any suspicious tube was subjected to microscopical examination. Chart No. 4 shows the effect of strong dilutions of Phenol and Cresol compositions upon our anthrax culture (Laboratory stock) and the strain seems unusually resistant.

To determine the comparative value of Cresol compound and Phenol in destroying the bacteria in a mammalian stool, a small mass of feces was rubbed up in sterile water, the mixture filtered and diluted to obtain a thin perfectly even emulsion of bacteria. The suspension was removed from the flask to three covered dishes, in which the test was made, by a pipette; this allowed a constant shaking for mixing and avoided all sedimentation. These dishes then contained the same quantities of feces solution with similar bacterial content. Plates were poured from all three before adding the germicide. It is well to agitate the solutions when adding the germicide, so that immediate mixture occurs. The results of eight tests may be seen in Chart No. 5. There is no explanation at hand for the rapid destruction of the bacteria by Liquor Cresolis Compositus, No. 2 in "a" but this is a mean of two tests. The discrepancy of "b" and "c" is striking and the secret must lie in the food and intestinal contents of the monkey.

In reviewing these results, it seems that they are more favorable to Liquor Cresolis Compositus than those of Dr. McBryde. The coefficient in terms of carbolic acid is practically two and sometimes higher in the weaker dilutions. Comparing the effect of the germicide on cultures and feces, it seems that .5 per cent. (1-200) of Liquor Cresolis will kill B. coli certainly within five minutes, while it will require fifteen minutes for carbolic acid in the same percentage to do the same thing. Five per cent. Cresolis No. 1 disinfected a human stool absolutely in four hours and reduced the count to forty in two hours, while carbolic acid could not do better than reduce the number to twenty in four hours.

It must not be lost sight of, however, that such experimentation is carried on under the most favorable condition for the germicide. Bacteria hidden by masses of feces could not be reached so readily and rapidly. Deodorization took place no more rapidly by one germicide than the other.

The germicidal effect of these two solutions on M. aureus is lower than on B. coli, but here also the Liquor Cresolis has the advantage. A .5 per cent. (1-200) solution, such as could be used for infections with this coccus, kills it in seven and one-half minutes, while a solution two thirds as strong (1-300) requires very little longer.

The results of comparison of the two germicides on Bact. anthracis are less reliable, The strong solutions of carbolic acid, did not, of course, remain in solution or suspension, so that they had to be shaken frequently, and even then the bacteria could not be said to have had the full effect of the given dilution, but of some indefinitely weaker ones. A conclusion upon these strong solutions is not justifiable.

One fact concerning the anti-bacterial action of Liquor Cresolis against Bact. anthracis is well illustrated in our work. This germicide will restrain the growth and germination of the spores of this organism when in very low dilutions. The technic in Chart IV was made with the platinum "oese." The following experiment was made by definite percentage method. One per cent. solution of Carbolic acid and Liquor Cresolis No. 1 and No. 2 were made in sterile water; to this was added an accurate four per cent, of a twenty day bouillon anthrax culture. At the expiration of the desired exposure time .1 c. c. was removed by a pipette and planted on fresh bouillon. This addition made the strength of the germicide in the last culture 1-5000. Carbolic acid in such a dilution did not restrain the vegetation of the anthrax spores, but no growth was obtained in the tubes made from the cresol flasks at the expiration of ten days. Then twenty c. c. of fresh bouillon was added to the tubes with the result that a good culture developed after four days further incubation. In these experiments the anthrax spores withstood four days longer exposure to carbolic acid than to Liquor Cresolis of the same strength. It is therefore evident that these spores cannot develop in a dilution of Liquor Cresolis which of carbolic acid allows multiplication.

Charts Nos. 1, 2 and 3 represent a composite of eight tests. Chart No. 4 is a composite of four tests. Each of the feces tests, given on Chart No. 5 was done twice, these figures being an average.

This work seems to warrant the following conclusions:

1. That Liquor Cresolis Compositus, U. S. P. is an efficient germicide against B. coli, Miscrococcus aureus and Bact. anthracis.

2. That its carbolic acid coefficient against M. aureus and B. coli is about two.

3. That a .5 per cent. solution will kill the colon bacillus in five minutes and should therefore be a good germicide for dejecta.

4. That is is probably more efficient against spore forming organisms than carbolic acid is, restraining growth in weaker solutions.

5. That intimate mixing is essential to its success. The cost per kilo or litre in the Laboratory is about three-fourths of that of pure carbolic acid.

Chart No. 1.—Germicidal Tests with Liquor Cresolis Compositus 'U. S. P.' Carbolic Acid used for Comparison.

The heavy lines indicate the average length of time which the organisms withstood the solutions.

Micrococcus Pyogenes Aureus.

	1	2	3	4	5	6	7	8	9	10
	1′	2½′	5′	7½′	10′	15′	20′	30′	40′	60′
Carbolic acid 1-50,	——									
Liq. cresolis 1-50,	——									
Carbolic acid 1-100,	——	——	——							
Liq. cresolis 1-100,	——									
Carbolic acid 1-200,	——	——	——	——	——	——	——	——	——	
Liq. cresolis 1-200,	——	——	——	——						
Carbolic acid 1-300,	——	——	——	——	——	——	——	——	——	——
Liq. cresolis, 1,300,	——	——	——	——						
B. Coli Com.										
Carbolic acid 1-50,	—									
Liq. cresolis 1-50,	——									
Carbolic acid 1-100,	——									
Liq. cresolis 1-100,	——									
Carbolic acid 1-200,	——	——	——	——	——	——	—			
Liq. cresolis 1-200,	——	——	——							
Carbolic acid 1-300,	——	——	——	——	——	——	——	——		
Liq. cresolis 1-300,	——	——	——	——						

Chart No. 1.—Germicidal Tests with Liquor Cresolis Compositus 'U. S. P.' Carbolic Acid used for Comparison.

The heavy lines indicate the average length of time the organisms withstood the solution. This chart shows the different values of the solutions of commercial Cresol from different dealers. Cresols No. 1 and No. 2.

Micrococcus Pyogenes Aureus.

	1	2	3	4	5	6	7	8	9	10	11	12
	1′	2½′	5′	7½′	10′	15′	20′	30′	40′	60′	120′	240′
Cresol No. 1.												
Carbolic acid 1-50,	——											
Liq. cresolis 1-50,	—											
Carbolic acid, 1-100,	——	——										
Lig. cresolis 1-100,	——											
Carbolic acid 1-200,	——	——	——	——	——	——	——	——	——	——	——	
Liq. cresolis 1-200,	——	——	——	——	—							
Carbolic acid 1-300,	——	——	——	——	——	——	——	——	——	——	——	——
Liq. cresolis 1-300,	——	——	——	——	——							
Cresol No. 2.												
Carbolic acid 1-50,	——											
Liq. cresolis 1-50,	——											
Carbolic acid, 1-100,	——	——	—									
Lig. cresolis 1-100,	——											
Carbolic acid 1-200,	——	——	——	——	——	——	——	——				
Carbolis acid 1-200,	——	——	——									
Carbolic acid 1-300,	——	——	——	——	——	——	——	——	——	——	——	——
Liq. cresolis 1-300,	——	——	——									

Chart No. 1.—Germicidal Tests with Liquor Cresolis Compositus 'U. S. P.' Carbolic Acid used for Comparison.

The heavy lines indicate the average length of time the organisms withstood the solution. This chart shows the different values of two solutions of commercial Cresol from different dealers. Cresols No. 1 and No. 2.

Bacilli Coli Compound.

	1	2	3	4	5	6	7	8	9	10	11	12
	1′	2½′	5′	7½′	10′	15′	20′	30′	40′	60′	120′	240′
Cresol No. 1.												
Carbolic acid 1-50,	—											
Liq. cresolis 1-50,	—											
Carbolic acid 1-100,	—											
Liq. cresolis 1-100,	—											
Carbolic acid 1-200,	—	—	—	—	—	—	—					
Liq. cresolis 1-200,	—	—	—	—	—	—						
Carbolic acid 1-300,	—	—	—	—	—	—	—	—	—	—	—	
Liq. cresolis 1-300,	—	—	—	—	—	—	—	—				
Cresol No. 2.												
Carbolic acid 1-50,	—											
Liq. cresolis 1-50,	—											
Carbolic acid 1-100,	—											
Liq. cresolis 1-100,	—											
Carbolic acid 1-200,	—	—	—	—	—	—						
Liq. cresolis 1-200,	—											
Carbolic acid 1-300,	—	—	—	—	—	—	—	—	—			
Liq. cresolis 1-300,	—	—	—									

Chart No. 1.—Germicidal Tests with Liquor Cresolis Compositus 'U. S. P.' Carbolic Acid used for Comparison.

The heavy lines indicate the average length of time which the organisms withstood the solution.

Bacteria Anthracis.

	1	2	3	4	5	6	7	8	9	10	11	12	13
	1′	1′	2 hr.	3 hr.	4 hr.	6 hr.	8 hr.	12 hr.	24 hr.	48 hr.			
Carbolic acid 1-5,	—	—	—	—	—	—							
Liq. cresolis 1-5,	—	—	—	—									
Carbolic acid 1-10,	—	—	—	—	—	—	—						
Liq. cresolis 1-10,	—	—	—	—	—	—	—						
Carbolic acid 1-20,	—	—	—	—	—	—	—	—	—	—	—		
Liq. cresolis 1-20,	—	—	—	—	—	—	—	—	—	—			

CHART NO. 5. GERMICIDAL TEST WITH LIQ. CRESOLIS COMP. U. S. P.

Human, Monkey and Guinea Pig Feces Dissolved in Water, Filtered and Germicide added. a. Monkey; b. and c. Human; d. Guinea Pig.

	Original.	5′.	10′.	30′.	60′.	2 hrs.	4 hrs.	6 hrs.
a. Solution of stool 100 cc,	27,000,000	30,000,000	27,000,000	Innum.	30,000,000	.....	.....	.....
Solution of stool 100 cc + .5 per cent. carbolic acid,	25,000,000	6,000,000	4,000,000	2,500,000	35,000	.....	.....	.....
Solution of stool 100 cc. + .5 per cent. cresolis No. 1,	35,000,000	*	*	*	*	.....	.....	.....
b. Solution of stool 100 cc,	15,000	16,000	26,000	14,000	20,000	28,000	.....	.....
Solution of stool 100 cc + .5 per cent. carbolic acid,	18,000	15,000	12,000	10,000	6,000	4,000	.....	.....
Solution of stool 100 cc + .5 per cent. cresolis No. 1,	17,000	4,500	2,000	2,000	3,000	1,800	.....	.....
Solution of stoll 100 cc + .5 per cent. cresolis No. 2,	22,000	1,500	1,500	1,500	1,500	600	.....	.....
c. Solution of stool 100 cc,	25,000	.....	.....	.....	.....	.....	.....	.....
Solution of stool 100 cc + .5 per cent. carbolic acid,	22,000	.....	1,200	.....	500	300	20	.....
Solution of stool 100 cc + .5 per cent. cresolis No. 1,	27,000	.....	1,200	.....	200	40	0	.....
d. Solution of stool 100 cc (contained sawdust, &c.),	15,000	.....	.....	16,000	.....	30,000	26,000	22,000
Solution of stool + 1 per cent. carbolic acid,	15,000	.....	.....	8,000	.....	5,000	5,000	4,000
Solution of stool + 1 per cent. cresolis No. 1,	15,000	.....	.....	5,000	.....	5,000	2,000	2,000

*Probably evidence of suppression as shown above in the case of Bact. Anthracis.

THE FOLLOWING PRELIMINARY REPORT ON THE PREDOMINATING MICRO-ORGANISMS IN FECES AND SEWAGE AS AN INDEX OF POLLUTION IN DRINKING WATER HAS BEEN PRESENTED BY DAMASO RIVAS, BACTERIOLOGIST TO THE DEPARTMENT.

The fact that Bacillus coli communis is an inhabitant of the intestines of man and other mammals has caused this organism to be regarded as an index of pollution in our water supply; some bacteriologists, however, basing their opinions upon the fact that Bacillus coli is also found in the intestines of other animals, and is widely distributed in nature, are inclined to regard this micro-organism as of no importance in water analysis. It is true that in most cases, if not always, too much reliance is placed upon the presence of Bacillus coli alone, which has led to an entire neglect of other and important micro-organisms in water; but since a water so contaminated, regardless of the source of pollution, cannot be considered as desirable for drinking purposes, and more especially since Bacillus coli at present is regarded as sufficient indication of pollution by sewage, it is desirable to make some observations upon the subject.

That Bacillus coli is a common inhabitant of the intestines is a well-known fact; that it is also found in sewage needs no further comment here, but since in the feces as well as in sewage, beside Bacillus coli, other micro-organisms are found in abundance, it is desirable to determine the numerical occurrence of Bacillus coli as well as other micro-organisms in feces and sewage. The purpose of this research was to determine:

First.—That if Bacillus coli is found to predominate in feces and sewage, this fact would give to this micro-organisms a more logical basis as an index of pollution.

Second.—If any other micro-organisms was found to predominate, could it be possible to attach to it more significance than to Bacillus coli?

Third.—Whether in the line of such research it would be possible to find another practical index of pollution which in some way would shed a new light on the vital problem of water analysis.

With these points in view the experiments were conducted as follows: a small amount of feces was dissolved in a test tube containing about six cubic centimeters of sterile salt solution and, after thoroughly shaking, one cubic centimeter of the mixture was transferred to another test tube; after shaking one cubic centimeter of the second tube was transferred to a third tube, and so on, ten to twelve dilutions being made from the original tube.

In the case of sewage collected at the South street bridge, West Philadelphia, as it emptied into the Schuylkill river, after thoroughly shaking the sample a portion of it was transferred to a tube of sterile salt solution, and, as in the case of the feces, ten to

twelve dilutions were made from the original tube. In each case, one cubic centimeter of each tube was plated on litmus lactose agar, and after an incubation of forty-eight hours at 37° C. the plates were examined and the colonies further studied.

Assuming that this technic would enable one to separate the different species of bacteria in the feces and sewage, by the subsequent dilution, it would also enable one to show in the corresponding plate the numerically predominating micro-organisms in the original tube.

To prove this assumption, experiments were made along the same lines with a mixture of B. anthracis, B. typhosus, and B. coli, by adding to the original tube a given quantity of these cultures, diluted in sterile salt solution. The number of bacteria per cubic centimeter was at the same time determined in each dilution of the above named three micro-organisms, before a given quantity of each was added to the original tube. From the original tube dilutions and corresponding plates were made, and without any exceptions the micro-organisms which was added in excess in the original tube was found to be the last to disappear in the subsequent dilutions. Further, in one experiment in which to the original tube were added 60,000 B. coli, 58,000 B. typhosus, and 2,400 B. anthracis, the least in number (B. anthracis) was found to disappear on the fifth dilution, and plate No. 6 (which corresponds to the sixth dilution from the original mixture) showed three colonies, two of them being B. coli and one B. typhosus, which showed beyond any doubt the accuracy of the technic. In the light of such results, I feel certain that such a procedure would enable one to determine in a precise manner the predominating micro-organisms, not only of feces and sewage, but also of coli, pus, in fact of any samples on which such research would be desirable. The procedure is in itself simple, and so accurate that such a slight excess as two thousand over a mixture containing in all about one hundred and twenty thousand of different kinds of bacteria could be detected.

In the case of feces and sewage, it was found that from the first to the fourth dilution from the original tube, the plates usually contained too many colonies; these became less after the fifth, and from the eighth to the twelfth dilution in most cases the plates remained sterile.

Plates which showed from ten to twelve colonies (which in most of the cases represented the corresponding sixth to eighth dilution from the original dilution) were further examined and each colony studied biologically and morphologically.

In the course of the investigation a great variety of distinct species were isolated, some of them being only occasionally found, and for this reason no especial attention was given them, but beside

B. coli, some variety of cocci and the sewage streptococci, there were four distinct varieties of bacilli encountered in each experiment, which, by their predominance in feces and sewage, I think deserve especial mention. As a matter of convenience I would designate these "A," "B," "C," and "D" bacillus, which gave the following characteristics:

"A" bacillus did not ferment dextrose, did not produce indol, did not liquefy gelatine, coagulated milk and was Gram positive.

"B" bacillus gave a culture characteristic of B. typhosus, but was negative to the Widal test.

"C" bacillus gave a culture characteristic of B. typhosus, but was Gram positive.

"D" bacillus resembled B. coli, but did not produce indol.

In an average made from the results obtained from feces, the following represents their order of predominance: 1st, sewage streptococci or other variety of cocci; 2d, B. coli, communis; 3d, "A" bacillus; 4th, "B" and "C" bacillus; 5th, "D" bacillus.

As shown in the above results, next to the cocci, B. coli was found to predominate in feces, but I consider it not advisable to deal in detail with the above results, because it is only in exceptional cases that the direct pollution of water by feces occurs. Further, because the pollution by sewage which represents the combined impurity from a community, I believe to be of greater importance from a sanitary point of view, and it suffices to say that beside B. coli and cocci, "A" bacillus was found to rank third in the feces, which is significant, and in view of the fact that it is second only to the cocci in numbers in sewage this bacillus may prove to be of importance as an index of pollution in water.

The average results obtained in the experiments made upon the predominating microörganism in the sewage is illustrated as follows:

1st, sewage streptococci or some variety of cocci; 2d, "A" bacillus; 3d, "C" bacillus; 4th, B. coli and "B" bacillus; 5th, "D" bacillus.

As shown in the above results, in both cases (in the feces as well as in the sewage) the cocci were found to take the first place in their predominance, but it is worth noting that "A" and "C" bacillus appear to be more abundant in the sewage by taking the second and third place, respectively, than B. coli, which occupies the fourth place; furthermore, the results show "B" bacillus to bear the same relation as B. coli, while "D" bacillus, as in the feces, so in the sewage, appears to be least abundant.

In a general consideration of the results so far obtained, it is to be noted that the sewage streptococci, or some variety of cocci due to their predominance in feces and sewage, would suggest the advisability of regarding them as the most reliable index of pollu-

tion. It must be remembered, however, that in the process of purification of water either by sedimentation, mechanical filtration, or by slow sand filtration, as well as by ozonization, in all the cases the process can be regarded as a selective one to a certain extent, but more especially it must be considered as a process of elimination. Therefore, such being the case, and since by any methods employed the purification of water is only partial, the cocci will be found in each instance to persist regardless of the relative purity of the water after treatment. The correctness of this statement is illustrated in the results obtained with the water supply of the city of Philadelphia, in which the raw water of the Delaware and the Schuylkill rivers, after sedimentations and slow sand filtration, which process gave a most desirable removal of bacteria (over 99.5 per cent. in some cases), the filtered water contained sewage streptococci in spite of the low number of bacteria (below fifty and as low as eight bacteria per cubic centimeter) in the effluent water. For this reason alone, if for no other, I believe I am correct in stating again the relative unimportance of these non-pathogenic micro-organisms as an index of pollution in the water.

I am aware of the limited number of experiments here reported from which to draw any definite conclusion, but hope they will serve to stimulate further research upon the subject. From the few results so far obtained, I feel justified in stating that not merely the presence of B. coli in the intestines (as with it there are a great many other bacteria associated), but more especially its predominance over other bacteria in the feces, gives to B. coli a sounder basis as an index of pollution in water. The "B" bacillus appears to be as important as bacillus coli, and "D" bacillus somewhat less so. And since "A" and "C" bacillus were found to be more abundant in the sewage than B. coli, undoubtedly they deserve further study and corroboration by other investigators. A thorough study of the predominating micro-organisms in sewage, I hope, will give a better understanding of the bacteriology of our water supply from a sanitary point of view.

Rivas also contributes following studies.

AN IMPROVED AND RAPID TEST FOR INDOL IN BROTH CULTURES AND FOR THE PRESENCE OF THIS SUBSTANCE IN MEAT-SUGAR-FREE BROTH.

B. coli communis presents some constant biological features peculiar to itself, by means of which the differentiation can be easily accomplished. As a matter of convenience, these reactions were named "Test 1," "Test 2," and "Test 3," respectively.

Test 1 is a negative test. When about one-fourth c. c. of sterile dextrose broth is boiled for a few minutes in about 5 c. c. of a ten per cent. sodium hydroxide solution, a light yellow canary color

is produced. Similar treatment of a forty-eight hour old culture of B. coli produces exactly the same result, whereas with allied species a pinkish coloration is imparted to the liquid on standing from five to fifteen minutes.

Test 2 consists in a bright purple or pinkish coloration produced by B. coli when about one c. c. of a ten per cent. sodium hydroxide solution and about one c. c. of a fifty per cent. sulphuric acid solution are added to the culture; cultures of the saccharolytic group produce no such reaction. A study of the nature of this reaction has proven it to be very closely connected with indol, or at least with some derivative of indican.

Test 3 consists in the inability of B. coli to exhaust the sugar in a one per cent. dextrose broth, the action on this substance ceasing after forty-eight hours at 37° C., and sometimes as early as eighteen hours, while allied species, regarded as the Colon group, go on uninterruptedly until the sugar is completely exhausted. In view of this peculiarity I believe it to be logical to substitute the name of "saccharolytic group" for these colon-like organisms. I deem it unnecessary to go into details of the test for determining partial exhaustion of the sugar by B. coli and complete exhaustion of this substance by the saccharolytic group. This subject was thoroughly considered in the previous paper, and it suffices here to say that the test can be determined by the polariscope, or more practically by Fehling's Solution, as in testing diabetic urine.

It is not our purpose to go deeply into the exact chemical nature of the reaction, but more especially to determine the following points in regard to them:

1. Relation of Test 2 to B. coli and the saccharolytic group.—After exhaustive observations upon a number of cultures of true B. coli and those considered to belong to the saccharolytic group, I believe that my results demonstrate that Test 2 is characteristic of the former, and that any culture which does not show this reaction in spite of other biological characters, should be discarded as a true colon and classified among the saccharolytes.

2. Time required to obtain a positive reaction.—To my satisfaction, it was found that Test 2 does not require the long wait of two to eight days required by the sulphuric acid and potassium nitrite test, but only one, or at the most two days of incubation at 37 C. In fact I have obtained this reaction on B. coli after six hours only, or in a shorter time, between four and five hours at 37° C., as soon as the slightest cloudiness of the medium was observed; this was never the case with the sulphuric acid and potassium nitrite test applied for comparison.

3. Relation of Test 2 to the sulphuric acid and potassium nitrite test.—As a matter of routine in studying a great number of cultures

isolated from different sources and compared with a B. coli culture as control, both tests were applied simultaneously to the same culture, and the result corresponded very closely to the test for indol. In a few instances, however, Test 2 (sodium hydroxide and sulphuric acid) was positive, while the test for indol (sulphuric acid and potassium nitrite) remained negative, not because such cultures did not produce indol, as the same thing was observed in the B. coli cultures, but because the test with sodium hydroxide and sulphuric acid was found to be more delicate and precise than the test with sulphuric acid and potassium nitrite, as determined by the following observation:

4. Differences in Test 2 and indol test with different strength solutions of indol.—Experiments with different strength solutions of indol crystals in distilled water were made and tested simultaneously by both tests. The sulphuric acid and potassium nitrite test gives a salmon-amber color, somewhat resembling the normal color of broth, while the sodium hydroxide and sulphuric acid gave a bright purple-pinkish color decidedly more distinct than the sulphuric acid and potassium nitrite test.

5. Delicacy of both tests.—The sulphuric acid and potassium nitrite test was positive to the dilution of 1:1,000,000—that is, when the test was applied with all precautions and concentrated in forms of rings; it was almost indistinct in 1:800,000 when tested otherwise. Test 2 (sodium hydroxide and sulphuric acid) was found to be positive in 1:1,400,000, regardless of any precaution in making the test since this does not depend upon any concentration of the reactions but upon a diffuse general coloration of the medium. Further to my satisfaction, by making the dilution with broth instead of distilled water, it was observed that the sodium hydroxide and sulphuric acid produced more or less destruction of the coloring matter of the medium, leaving an almost colorless broth upon which the reaction appears more pronouncedly, while the sulphuric acid and potassium nitrite produced no change in the color of the broth, which in some ways obscures the salmon-amber color of the reaction.

It was further noted that the color of the broth has an important bearing upon the sulphuric acid and potassium nitrite test, the darker the medium the less distinct being the reaction. Following this line of observation we found the test to be positive in some cases in the concentration of 1:500,000 only, and not beyond that point. Therefore for this reason, if for no other, Test 2 (sodium hydroxide and sulphuric acid) is preferable to sulphuric acid and potassium nitrite. Further it is not necessary to concentrate the reaction in the form of rings a method requiring a careful technic by no means always successful, but merely to add the sodium hydroxide and sulphuric acid without any special precaution. The

coloration is a diffused bright purple-pink, of itself distinct and characteristic.

Having determined by the above experiment that Test 2 (sodium hydroxide and sulphuric acid) bears a very close relation to the sulphuric acid and potassium nitrite test for indol, and having observed that this test is not only more delicate and in many ways superior and more easily performed, attention was next directed to determine if the meat-sugar-free broth made by the previous fermentation and exhaustion of the inosite in the meat juice during the incubation of eighteen to twenty-four hours at 37° C., a method suggested by Smith and accepted by all bacteriologists, could be regarded as free from indol. It is stated that such preliminary fermentation by B. coli does not produce any perceptible amount of indol; however, in an effort to determine the correctness of both assertions, it was desirable to make some observations upon the subject. That indol is never produced in the presence of sugar is a well-known fact, but is it not possible that the amount of sugar present in the meat juice would be so small as to be easily exhausted by the B. coli in a few hours so that in the remaining time this organism would attack all proteid substances in the meat juice sufficiently to transform them into indol? Having determined that the sulphuric acid and potassium nitrite test for indol is not very delicate, and being in possession of Test 2 which showed itself to be more delicate and reliable, some experiments were conducted to determine the presence or absence of indol in meat-sugar-free broth.

Meat juice was tubed and sterilized in the autoclave at twenty pounds pressure for twenty minutes and a series of tubes inoculated with B. coli cultures (the amount inoculated was one drop of a twenty-four-hour-old broth culture, this small amount being employed to avoid any possible error from the material transferred) and placed at 37° C. A number of tubes were tested by Test 2 after two, four, six, twelve, eighteen, twenty-four and forty-eight hours respectively. In some cases a positive reaction was obtained as early as after six hours' incubation. Most of the tubes showed a positive reaction after twelve hours, and this was more marked after eighteen hours of incubation at 37° C.

Following the same line of experiments the meat juice was tubed and without any preliminary sterilization, inoculated with B. coli and incubated at 37° C. The test was applied as before, and the result was much the same. Further, with the idea that perhaps the subsequent sterilization would produce some changes in the indol occurring during the preliminary fermentation of the meat juice both experiments were repeated, but this time the test was applied after submitting some tubes to 100° C., and others to twenty to thirty pounds for twenty to thirty minutes. In both cases the heat was found to have had no effect on the reaction, as it was as typical

and distinct as when no heat had been applied before performing the test, proving beyond any doubt that the subsequent sterilization, that is, the heat, has no effect on the reaction. This substantiated my experience in finding a positive reaction of indol in sterile broth control tubes, as well as in medium stored for laboratory use, and to this, no doubt, is due our recent literature on indol-positive typhoid strains.

As a matter of corroboration, and especially in order to determine in a more precise manner whether this substance was produced during the preliminary fermentation of the meat juice by B. coli, under exactly the same conditions the sulphuric acid and potassium nitrite indol test was applied in all the above experiments and the reactions were found to be negative after six hours. In one case only a very slight indol ring was obtained; in a few instances the reaction was concentrated in the form of rings after twelve to eighteen hours and usually this was positive after twenty-four hours of incubation at 37° C.; this proves beyond a doubt the presence of indol sometimes in the meat-sugar-free broth. It is not true that all meat-sugar-free broth contains indol. In some experiments I was unable to detect this substance, due probably to an excess of acidity in the meat juice or to unfavorable conditions under which the preliminary fermentation was carried on, or to some inactivity of B. coli itself, which inhibited its action on the proteid substance, and under such circumstances it is a question whether even the sugar has been exhausted from the juice and whether such a broth can be regarded as free from this substance. It is a question, I believe, if this preliminary fermentation be desirable in order to exhaust the sugar in the meat. If so I would recommend the use of the saccharolytic group which rapidly attacks the sugar and produces no indol. Such cultures can be easily isolated from water and be used with advantage instead of B. coli; I use for the present some of these cultures isolated from water producing 80 to 100 per cent. of gas in twenty-four hours, which under the most delicate test have given negative indol reactions.

Before concluding, it is my desire to state that Test 2, if it be not a test for indol, can be properly regarded as something very closely related to it. Inasmuch as it is characteristic of B. coli it seems justifiable to use it in determining the identity of this organism, even though it may not be the same as the indol test.

In conclusion, I think the points to be emphasized from the results are:

First, the ease with which the test may be applied.

Second, the distinct and characteristic color.

Third, its applicability after an incubation of twenty-four hours, whereas by the ordinary indol test, a culture of eight days is recom-

mended. (In this laboratory, forty-eight hours' incubation is given with the most satisfactory results.)

Fourth, the reaction does not have to be concentrated in the form of a ring.

Fifth, the rapidity with which a culture may be identified as a true B. coli.

Sixth, B. coli should be discarded as an agent for exhausting the sugar in broth, and one of the saccharolytic group used instead.

Some improvements in the sterilization of culture media with especial reference to the fractional method.

The not infrequent occurrence in the course of bacteriological research of discrepancies of results, or even of total failure of the experiment when apparently the technical procedure were faultless, coupled with apparently inexplicable contaminations in culture or in a medium after storage for a time, have led the writer to suspect the methods of primary sterilization in vogue as lacking uniform sufficiency and induced the following study of this subject:

In a medium which had been sterilized in the autoclave at fifteen to twenty pounds pressure for from fifteen minutes to one-half hour, and thereafter kept at room temperature and examined daily, it was sometimes observed that in the course of a few days a growth had occurred in some of the tubes, and only in exceptional instances were the tubes all free from contamination after a period of from three to six months. In case of nutrient gelatin, sterilized at ten pounds pressure for ten to fifteen minutes, no instance was observed during the period of this study in which all of the tubes remained permanently sterile; and in one lot, after maintenance of the tubes for one to two weeks at 37° C., over one-half were found contaminated. Similar results were obtained with culture media sterilized by the fractional method, as usually recommended (heating on three successive days at 100° C. for thirty minutes, with the media left at room temperature in the intervals). With such faults in mind it was deemed desirable to make a close study of the causes of these irregularities and to attempt some modification of procedure promising greater certainty of complete sterilization.

Satisfied from comparative examinations that the fault is one entering from incompleteness of primary sterilization, it at once suggested itself that an important proportion may be due to the presence of spores resistant to the ordinary measures to which the medium is subjected. Apparet, a century ago, was the first to discover the method of conservation of preserves in stoppered bottles after the bottles had been boiled but in his experience, in spite of boiling the containers well for several hours, it was not an infrequent occurrence that the preserves spoiled. Globbin, in 1888, observed in case of an organism isolated from potato that the spores

were capable of resisting 100° C. from five to six and one-half hours, of withstanding 109° to 113° C. for three hours, and required for destruction exposed to temperature of 113° C. to 116° C. for twenty-five minutes, or of 130° for three minutes. In the same year Koch found the spores of B. carrotarum to resist 100° C. for eight hours, and to require four hours' exposure to 130° C. sterilization. In 1894 Flügel obtained similar results with spores of certain bacteria isolated from milk. Christ, in 1895, found spores of organisms isolated from the soil capable of resisting 130° C. for one minute. The valuable researches of Heinze, in 1903, are well known in connection with B. megartherium, B. ellembachensis, and B. subtilis, the spores of the last capable of resisting 100° C. for three hours. I was able to observe in experiments made along the same line in the Institut Pasteur the capability of the spores of B. subtilis to resist exposure for two and one-half hours to 100° C. In case of the bacteria isolated from fresh bread it is familiar knowledge that their spores have resisted the heat of the baking oven. Many similar common examples of such resistive power readily occur to mind; and literature records numerous observations of facts of the same import, indicating the possibility of the dependence of failure to destroy original contamination of material by such heat-resisting entities.

It must be quite probable, too, that in addition to the above possible fault the protection afforded to contaminating organisms against the sterilization exposure may contribute in no unimportant measure to the same end. While the B. tuberculosis and the other non-spore-bearing organisms are easily destroyed by a direct exposure to 60° C. for from ten to fifteen minutes they are capable when protected by albuminoid substances (sputum, feces, etc.), of resisting for a long time an exposure of 100° C. When in Berlin the writer had the opportunity of observing in the case of the tubercle bacillus, the retention of virulence by organisms obtained in scrapings from the walls of one of the tuberculosis wards after the room had been empty for over four months. Explicable in the same principle, it is a well-known fact that the sterilization of bouillon or any liquid medium is more easily accomplished than of agar or more especially nutrient gelatin; in fact, the writer has observed the complete sterilization of bouillon after a single exposure of thirty minutes to 100° C., but has never obtained similar results with gelatin.

Although the above factors (special resistance of contaminating spores and the protection afforded contaminations by the medium) might well explain imperfections of sterilization by the autoclave, it suggested itself that in case of fractional sterilization (in which as is known the spores are permitted to germinate in the intervals of heating and in their vegetative form become susceptible of destruc-

tion by the subsequent heat exposure) this failure might find another explanation, and with this in view the following investigation was pursued.

Nutrient gelatin was distributed in tubes previously sterilized by dry heat at 180° to 200° C. for fifteen minutes or longer (until a browning of the cotton plug appeared, which indicated the decomposition of the organic matter or complete sterilization) and sterilized by fractional or intermittent exposure to 100° C. for fifteen to thirty minutes on three successive days, being left at room temperature during the intervals; but in spite of all precaution taken, in a number of these tubes, after storage at room temperature or in the incubator at 37° C. in the course of from twenty-four hours to several days' contamination became apparent, the varying time apparently being related to the temperature of storage locality. This last at once suggested that in case of contamination by spores resistant to heat the room temperature exposure of the intervals might very well not be the most favorable temperature for germination of such spores in the vegetative forms; in other words, the spores present originally and not destroyed by the exposure to 100°. in the first might at the temperature of the interval remain as such (unchanged) and be equally resistant to the heat of the sterilizing process on the second day, and that the same results might follow for the second interval and on the third heating, and that subsequently during the prolonged storage of the medium they might germinate. An experiment made in this line proved such to be the case.

Old cultures of Bacillus subtilis and spore-bearing moulds were inoculated in different media and left at room temperature, daily observation showing the medium to remain perfectly clear for from one to seven days, according to the temperature of the room and season of the year. These two organisms were preferred because, in the writer's experience, these have been found the most common and in many cases the sole agents of medium contamination. This variation in rapidity of development suggested that in the process the room temperature intervals might prevent the germination of spores, as this might well be deficient, and that, therefore, it must be desirable to provide in these intervals of sterilization surroundings of a temperature more favorable for the spores to germinate and cause the vegetative stage of growth. With this in view gelatin medium, after the first exposure to 100° C. for thirty minutes, was tubed—the tubes divided into groups. Part were placed in the incubator at 37° C. for six hours, other series were incubated at the same temperature for twelve, eighteen, and twenty-four hours, respectively; after such periods re-sterilization at 100° C. for thirty minutes was again performed for each group and the tubes stood at 37° C, for observation. As was expected, but few tubes subse-

quently were found contaminated, the results being much more favorable than when the room temperature had been employed in the intervals of heating. Further, it was noted that the short interval of incubation, for but six hours, was too short for germination of the spores even at body temperature; and that on the other hand, eighteen to twenty hours' incubation was too protracted, since in these periods the medium became undesirably clouded for growth of the organisms, while intervals of incubation for from twelve to eighteen hours gave the most favorable results. Following these determinations another series of observations was made for the purpose of comparisons between the common practice of heating three times in fractional sterilization and two exposures. A series of tubes were heated for thirty minutes to 100° C., then incubated at 37° C. for from twelve to eighteen hours and submitted to a final sterilization at 100° C. for thirty minutes. A second series of tubes was exposed on three successive days for thirty minutes at 100° C. and incubated at 37° C. for twelve hours in the first interval, and for twenty hours in the second interval. The results in these two series were practically identical, both being satisfactory.

With a view of determining the possibility of completing a fractional sterilization in a single day, as in case of need of some media for which the use of the autoclave is unsuited, as a sugar or gelatin medium (the high temperature of the autoclave producing undesirable changes in such media), a medium was prepared early in the morning and sterilized at 100° C. as usual at about eight o'clock, then incubated at 37° C. until about five o'clock in the evening, when it was again sterilized as previously. The results were quite satisfactory, again proving the efficiency of the method and establishing the advantage of material saving of time. Such procedure can, however, be recommended only for use in emergencies, as the writer feels the need of strongly emphasizing the desirability of incubating any medium for at least forty-eight hours after sterilization is supposed to be complete, in order to detect and then eliminate any possible contamination.

It is deemed unnecessary to recommend or outline any special rule for the above procedures. Good results may be obtained by the usual practice of sterilizing on three successive days, with a first interval of twelve hours for incubation and a second interval of twenty-four hours; or by sterilizing but twice, with an interval of twelve hours for incubation; and as just stated, the sterilization can be completed in a single day. The routine method followed by the writer, with most satisfactory results, includes the preparation of the medium early in the morning and at once exposing it to 100° C. for about ten or fifteen minutes, then incubating at 37° C. for six to eight hours during the same day, and toward evening again subjecting it to 100° C. for fifteen to twenty minutes, followed by a

second interval of incubation at 37° C. over night, and a final heating the next morning to 100° C. for thirty minutes. This shortens the general routine by one full day, and, too, the heat exposure is reduced by one-third, each a material advantage when at the same time the final result is not impaired, but, as above indicated, rendered more sure of success. The precise method may vary with the judgment of each worker, the writer's only desire being to point out the necessity for providing a temperature during the intervals of heating which will favor the germination of the spores, so that in their vegetative form they may be the more certainly destroyed at the next period of heating, and at the same time to urge the fact that the ordinary room temperature cannot by any means be regarded as favorable for this purpose in the intervals commonly allowed between sterilizations.

There is a further feature bearing upon the above which it is not inappropriate to bring forward in this relation. In spite of all precautions ordinarily taken in sterilizing media either in the autoclave or by the above outlined fractional method the writer has not found it always possible to avoid contamination of some of his tubes. It must be recalled that by either method the cotton plugs became more or less wet from exposure to the steam atmosphere and from the vapor arising from the heated liquid medium; and it is to be expected that by mere capillarity a more or less continuous thin sheet of the condensed moisture will intervene between the plug and the glass of the container (present in the cotton plug as well, but, perhaps, not in as perfect continuity). Through such a continuous liquid it is possible that occasionally organisms coming from the air of the open room in which the tube is cooling might be afforded a path of entry from the exterior to the interior of the tube; and it must be realized that the lower the room temperature when the tube is first brought from the heated sterilizer the more decided a current of air is drawn through the plug, as the interior air becomes cool and contracts, possibly aiding in the introduction of organisms, as just suggested. To avoid such a possibility the transference of the medium from the sterilizer to an incubation oven at 37° C. for at least forty-eight hours most clearly aids drying the surface of the plug more quickly and at the same time permitting, to a less degree, the rarefied air in the tube to cool and condense rapidly. Personally the writer is inclined to believe that lack of this precaution is not infrequently responsible for the contaminations which enter to spoil this or that experiment, to cause contradictory results in the work of the same or different investigators, and which have added much to the uncertainties and volumes of our bacteriological literature.

Some may be disposed to hold that if the medium has been properly sterilized, subsequent incubation for forty-eight hours, as above suggested, at 37° C. is unnecessary. This is in theory true.

but in practice what means do we possess of knowing surely whether the medium is pure, save by subjecting it to conditions known to be most favorable for growth of contamination, if perchance contamination exist? The time is past when water analysis was limited to its physical properties alone; and just as to-day no one would pretend to estimate the number of bacteria in a sparkling water or its sanitary condition by its clearness, in the same way, we are not justified in assuming that because a sample of bouillon or other medium remains transparent after storage at room temperature or in the refrigerator, as usually recommended, under conditions unfavorable for the germination of spores possibly present, it is, therefore, a sterile medium. The procedure recommended is logically correct and so simple that no objections of inconvenience or lack of necessity should be held material against it; and it may be urged as a definite rule of procedure that in all sterilization by steam, whether in the interval or after the fractional method, or after the use of the autoclave, the medium should not be directly exposed to room temperature or a lower temperature, but should be placed in the incubator at 37° C. because this condition will both aid in early and certain detection of possible contamination, and will in some measure favor the exclusion of organisms liable to be drawn into the container by air suction in undue moisture of the cotton plug. The writer might add, in conclusion, that it is his opinion that the fractional method of sterilization, as above recommended, might often with advantage replace the autoclave not only in efficiency of sterilization, but more especially as evading the production of undesirable changes which the high pressure and temperature of the autoclave have been found to produce in culture media.

THE DIFFERENTIATION OF BACCILUS COLI COMMUNIS FROM ALLIED SPECIES IN WATER.

It is not the purpose of this report to deal with the old and controversal question of the significance of Bacillus coli communis as an indication of pollution in drinking water, nor to go into detail upon the typical or atypical biologic characteristics of the organism; but especially to determine a constant biologic feature by which it can be differentiated with certainty from the allied species of the colon group. It is common knowledge that B. coli communis presents such extensive variations that often cultures isolated from water and reported as identical with this mirco-organism will, if studied more closely, be found to have very little or no relation at all with it. The hypothesis that the acceptance of such variations in B. coli communis is responsible for the unsatisfactory results often obtained in the bacteriologic examination of drinking water has been the basis for undertaking the following studies.

I believe B. coli communis, like B. typhus, B. diphtheriæ, B. anthracis, etc., is a single micro-organism, not a group; and if its biologic and morphologic features are sufficiently studied, is not to be confused with others. It is true that sometimes an atypical reaction is seen, but this irregularity if carefully inquired into will be found to depend, not on the colon bacillus itself, but on the condition in which it has been placed. The colon bacillus is commonly regarded as an acid-producing micro-organism. The reaction, however, depends entirely on the presence of sugar in the culture media; and in plain neutral bouillon the reaction of the culture will be alkaline.

A. Production of Indol.

This depends on the presence of a proteid substance, peptone for instance. In such a medium, moreover, the presence of sugar inhibits the production of indol, which will be manifested only after the sugar has been exhausted by the colon bacillus. Further, under anaërobic conditions and by cultivating the organism on special media containing phenol, nitrates, etc., the production of indol may be inhibited or completely abolished; and following the ordinary technic, by using a one per cent. peptone bouillon Lembke, Roux, Widal, Malvoz, Vallet, Dunham, and others, have reported cultures not producing indol, but otherwise typical of B. coli communis. Morris, however, by employing a five per cent. peptone bouillon and making his test after from ten to twenty days, obtained positive indol reactions from the same cultures: It is probably due to such variations that our literature on the organism in question is full of such classifications as "strong indol-producing colon bacilli," or marked "distinct," "weak," "faint" and finally "negative" indol-producing types. Such classifications seem to me the result of too precipitate conclusions from superficial observations. They are presumed to depend on variations in the organism when in reality they are the result of variations in the medium of cultivation and the technic employed.

Much to my surprise, I have often observed a positive indol reaction in sterile meat sugar-free bouillon, and a close study of the subject has convinced me that the practice of preparatory fermentation of the meat-juice with B. coli communis, as recommended by Smith and followed by leading bacteriologists abroad and in this country, can not be too strongly condemned. This preliminary fermentation with the colon bacillus for from eighteen to twenty-four hours (and by neglect often forty-eight or more hours) is sufficiently protracted for the production of more or less indol, which then remains in the medium. The sterilization I found to be without effect in this reaction, as the medium thus fermented gave typical reactions before and after exposure not only of thirty minutes to

100° C., but also after from twenty to thirty pounds steam pressure exposure for half an hour. To this, doubtless is due our new literature on "indol-positive typhoid cultures." In this laboratory I employ a strong saccharolytic organism isolated from water, producing from 80 to 100 per cent. of gas in from eighteen to twenty-four hours, rapidly exhausting all sugars, and failing in the most careful test to produce indol. With the medium thus prepared I have never obtained the slightest trace of indol in any typhoid cultures which I have examined; and it is my belief that no typhoid organisms can produce indol and that no true B. coli communis ever fails to show the reaction of Salkowsky.

B. Non-Liquefaction of Gelatin.

Almost every bacteriologist is of the opinion that a liquefying organism does not belong to the colon group, and that of B. coli communis never liquefies gelatin. It is not the question of liquefaction or no liquefaction which I wish to discuss, but rather the conditions under which such an important reaction is tested. The procedure recommended by the American Medical Association includes incubation at from 20° to 22° C. and the use of medium of from 1 to 1.5 per cent. acidity, both of which I have found unsatisfactory, not because B. coli communis will be affected by the reaction of 1.5 per cent. acidity, but because the proteolytic fermentation proceeds better and more quickly in most cases in alkaline or neutral medium and takes place best at 37° C. As a routine procedure in the laboratory, I use neutral gelatin and incubate at 37° C. for from forty-eight hours to four days. The tube is placed in ice water to harden the gelatin and then examined for liquefaction or non-liquefaction of the medium. The method has given far better results, and what is of most importance, it is the only way to eliminate gelatin-liquefying growths which at from 20° to 22° C. in the acid gelatin do not produce proteolysis and are often mistaken for B. coli communis.

The classification of cholera spirilla into species, causing rapid, slow, slight and very slight liquefaction, I believe to be only a matter of reaction of the medium and temperature of incubation. In case a number of laboratory cultures as well as six others isolated from the Schuylkill river, tested after growth in neutral gelatin at 37° C. for from forty-eight hours to four days, the liquefaction was complete; but it was only partial when the organisms were kept in other cultural conditions.

C. Amount of Gas.

It is regarded as characteristic of B. coli communis that there should be produced from 50 to 75 per cent. volume of gas in the closed arm of the fermentation tube in from twenty-four to forty-

eight hours (of which the relation of hydrogen to carbon dioxid is represented by the formula H : CO^2 : : 2 : 1, also that the fermentation is usually completed in twenty-four hours at 37° C. I have observed, however, that cultures of B. coli communis recently isolated from water producing no gas at all in twenty-four hours and after forty-eight hours at 37° C. only 15 per cent. The relation of hydrogen to carbon dioxid just mentioned may be regarded as correct, but it is by no means constant and reliable, a formula H : CO^2 : : 3 : 2 being even more frequently obtained, and formulas such as 3 : 1 or 4 : 1 or even higher may be observed according to the time at which examination is made. If cultures are closely observed it will be noticed that after twenty-four hours, when the gas formation is stopped, a gradual reabsorption of the carbon dioxid by the medium takes place, and the result gives an apparent excess of hydrogen. Further, when the sodium hydroxid solution is added to absorb the carbon dioxid a partial vacuum is produced and should the mouth of the fermentation tube be imperfectly closed by the thumb or by a rubber stopper, access of air is permitted and the results may fail to show any carbon dioxid at all. It is possible, therefore, from conditions in which the culture is placed or from failure in the technic to obtain a typical colon bacillus gas formation from an organism which under more careful observation would show the contrary.

The above features are presented in order to show that the irregularities obtained in cultures are not due to different types of the colon bacillus, but to the conditions under which the culture is grown, or to imperfect technic, and to indicate that the organism should be regarded as essentially a monotype bacillus and not as a group.

Differentiation Reaction.

With this view in mind, an attempt was made to find some reactions to serve as constant and reliable means of differentiation. After a series of tests, it was found that if, in each of a number of tests, about 0.25 c. c. to 0.5 c. c. of a forty-eight hours culture of various organisms on one per cent. dextrose bouillon was rapidly boiled in about five c. c. of a ten per cent. solution of sodium hydrate, there will appear immediately after boiling a clear yellowish-lemon color in the tubes of B. coli communis (similar reaction is obtained also with the uninoculated control one per cent. dextrose bouillon); while in others, as an indication of the absence of this microorganism, the solution will remain clear and colorless, taking on a slight pinkish color after five or ten minutes; this reaction I have arbitrarily called Test 1.

In another and independent observation conducted in other cultures isolated also from water, I found that if about one c. c. of a ten per cent. solution of sodium hydrate and then about one c. c. of

a fifty per cent. solution of sulphuric acid be added to the cultures, some tubes will remain colorless, while others will take on a purple reddish coloration either at once or within a few minutes. Closer study of this reaction showed this to be positive as soon as a growth was apparent in the medium, even as early as four or five hours incubation at 37 C. in neutral bouillon; and further investigation indicated that this purple coloration with sodium hydrate and sulphuric acid was characteristic of the B. coli communis cultures (Test 2).

This test shows the color reaction on the addition of acid and its disappearance when alkali is added in excess; this is a direct reverse of the color reaction of Test 1, in which the color is discharged by acid and reserved by alkali. The color in Test 2 is not produced in the presence of sugar. It is apparently related to the presence of indol or some indigo derivative. Test 1 seems to depend on the biologic action of the bacteria on the sugar, while Test 2 depends on the action of the B. coli communis on proteid substance; and the striking and ready production of these color reactions aid materially in facilitating the differentiation of bacillus coli. Further study is in progress to determine the nature of these reactions.

Action of the Colon Bacillus on Sugar.

It was deemed desirable to avoid experimenting in this connection with the different kinds of sugars, as dextrose, lactose, saccharose, fructose or mannite, etc., since, while such study undeniably is of scientific interest, the multiplication of these sugar-media opens the chance of to ready and disastrous confusion of results; based on the fact that any saccharolytic micro-organisms having the power of splitting other sugars have, in my work, never failed to attack dextrose, my observations were made on cultures in media containing this sugar alone. B. coli communis was incubated in a five per cent. dextrose bouillon, and the culture daily examined polariscopically for the exhaustion of the sugar in the medium. It was found that the sugar after forty-eight hours remained the same as after twenty-four hours; in other words, that the bacillus showed but a weak sugar-splitting power, the saccharolytic action ceasing after twenty-four and sometimes after eighteen hours. With this fact in view, established by identical results in a number of experiments on the same line, it was thought well to make the same observations with other cultures which also possessed saccharolytic activity, but which gave atypical reactions for B. coli communis. From a number of such strains in the laboratory, one was selected and incubated in five per cent. dextrose bouillon and daily polariscopic examination pursued as in case of the true colon bacillus above mentioned. In this instance the sugar was found to be considerably diminished

after from eighteen to twenty-four hours, and to have disappeared entirely from the medium in from two to three days at 37° C. The results in tabular form were as follows:

	Per cent.
Control sterile dextrose bouillon,	1.17
Bacillus coli culture after 24 hours at 37 deg. C.,	1.01
Bacillus coli after 48 hours at 37 deg. C.,	1.01
Bacillus coli culture after 72 hours at 37 deg. C.,	1.01
Allied species culture after 24 hours at 37 deg. C.,	0.66
Allied species culture after 48 hours at 37 deg. C.,	0.18
Allied species culture after 72 hours at 37 deg. C.,	0.00

These results, indicating the more complete saccharolytic ability of this allied species than that of B. coli communis, gives a constant feature of the various species in the group of micro-organisms liable to be confused with the colon bacillus, another reliable differential test. In order to avoid the necessity for polariscopic examination of the cultures, a series of investigations, in which Fehling's solution was employed was pursued. The cultures as above were tested after twenty-four, forty-eight and seventy-two hours incubation at 37° C., the Fehling's solution was diluted with equal parts of water, as usually done in qualitive examinations of urine for sugar, and divided among a number of small test tubes, one c. c. being placed in each. To these the culture was added in increasing amounts, beginning with one, two, three, etc., drops up to one c. c.; and the mixture then boiled. The result was striking. The controls or non-incubated medium gave positive sugar reactions with one or two drops according to the percentage of sugar in the material; cultures of the colon bacillus gave positive reactions with about twice the amount added as in case of the controls—two or three drops; while the allied species failed to show reduction of the copper even after the addition of as much at one c. c. of the culture. Often tests were conducted with different proportions of dextrose in the medium, from 0.1 per cent. to five per cent. dextrose bouillon and after forty-eight hours' incubation at 37° C., the differentiation was the most typical.

In view of such results, I have tentatively proposed for that group of organisms which present characteristics similar to that of B. coli communis, but not corresponding completely to this organism and which are commonly spoken of collectively as the "colon group," the substitution of the name "the saccharolytic group," the name being based on the splitting action manifested by them for dextrose. The leading features of this saccharolytic group may be said to consist of their powerful action on dextrose, their usual failure to produce indol and their tendency to cause liquefaction of gelatin.

In the group, however, are a few individual types which fail to liquefy gelatin and a few which will produce indol. The separation of such examples may, however, be definitely made by the colorless to pinkish color reaction of Test 1, or by the absence of the purple reddish color reaction of Test 2, as above described, and by the test of their exhaustion of sugar from a one per cent. dextrose bouillon medium after incubation for forty-eight hours at 37° C. (Test 3).

Being convinced of the importance of this strong sugar reaction of the saccharolytic group and its absence in case of the colon bacillus, an investigation was made to determine the actual explanation of the difference thus manifested. Two suppositions were considered: First, that B. coli communis may possess slower actions on the sugar; or second, that it produces some substance which inhibits the saccharolysis which would otherwise preceed as in the saccharolytic group. Both types of organisms begin to form gas at about the same time, but the colon bacillus produces gas more slowly than the group of allied species and its gas production ceases after from twenty-four to forty-eight hours. The saccharolytic group, on the contrary, after beginning about the same time as the colon bacillus to produce gas, continue more rapidly and do not cease until the sugar is entirely exhausted, the duration varying with the percentage of sugar in the medium. At the same time it was found that the acidity of the medium was greater with the colon bacillus, which produced from three to five per cent. in forty-eight hours; while the saccharolytic group produced only from one to three per cent. in the same period. This difference suggested that the greater acidity of the medium in case of the colon bacillus may exert an inhibitive influence on the further action of the organism on the sugar. By adding a few grains of sterile calcium carbonate to the cultures after the fermentation had stopped and absorption had begun, with the effect of neutralizing the media, it was found in confirmation of this supposition that more gas is evolved and the sugar further diminished (even to exhaustion). As suggested by Dr. Smith, the acidity of the culture was found to be due to the presence of lactic acid.

Before concluding I would like to point out briefly that, in view of the apparent variations of B. coli communis, Booker recognizes seven varieties of organisms of the colon group resembling the colon bacillus morphologically and biologically (but with no especial mention of the production of indol): that Gilbert describes five types: (a) non-motile but otherwise typical colon bacillus, (b) non-productive of indol, but otherwise typical colon bacillus, (c) non-fermenting lactose, but otherwise typical colon bacillus, (d) non-motile and non-fermenting lactose, but otherwise typical colon bacillus, (e) non-motile non-fermenting lactose, non-productive of indol, but other-

wise typical colon bacillus, that Fremlin regarded fermentation of dextrose and coagulation of milk as the most reliable indication of B. coli communis; that others regard the fermentation of dextrose alone as sufficient evidence of the identity of this bacillus. It is remarkable to note the elasticity of colon bacillus as disguised at present under the name of "the colon group." This elasticity is due, however, to the general conception of the colon group, a term used to cover all bacteria from the true B. coli communis to the B. typhosus, and the failure of many observers to realize the individuality of the various members of the chain. Careful controlling of all colon-like organisms with the two-color and sugar-exhaustion tests will serve to limit names, and it is with the hope of establishing a clear identity of this important indication of sewage pollution that these methods are offered.

Conclusions.

From the above I believe the following conclusions to be logical:

1. The saccharolytic group, as its name implies, represents not only one but different kinds of micro-organisms commonly found in nature, especially in water, characterized by its predominating action in splitting dextrose.

2. The constant occurrence of this group in water may prove to be a factor in itself which may shed a new light on our vital problems of the bacteriology of water.

3. The B. coli communis must not be confounded with the colon group, which I name "saccharolytic group," holding that this group should have no relation to the colon bacillus.

4. Since the saccharolytic group is shown to be more closely related to what at present is regarded as the colon group, the substitution of "saccharolytic group" for "colon group" is more comprehensible, and I hope will aid considerably, not only in relieving the confusion which the colon group presents, but especially in establishing the colon bacillus as a distinct type of micro-organism and not an indefinite chain of them, as it is considered at present.

5. B. coli communis, in addition to the recognized characteristics, will be positive to Test 2 and negative to Tests 1 and 3 (that is, it will fail to exhaust the sugar in one per cent. dextrose bouillon at 37° C. in forty-eight hours), while contrary to this the saccharolytic group may in many ways present characteristics of the colon bacillus, but will always be negative to Test 2 and positive to Test 1 and Test 3 (that is, it will exhaust the sugar in forty-eight hours at 37° C. in one per cent. dextrose bouillon).

6. B. coli should be discarded as an agent for exhausting the sugar in the meat juice and one of the saccharolytic group should be used instead.

CONTRIBUTIONS TO THE STUDY OF B. TYPHOSUS AND B. COLI COMMUNIS IN WATER.

The discrepancies in the results so often encountered in the bacteriological examination of water, and the negative results in the search for Bacillus coli in samples known by other reasons to originate from polluted sources, have misled several bacteriologists to regard this organism of little or no value as an indication of pollution. One regards with suspicion the few reports in the literature of the isolation of Bacillus typhosus from water, because of the small percentage of positive findings compared with the number of attempts made with such object in view.

As I have demonstrated in a preliminary study on this subject it is not the mere presence of Bacillus coli in the intestines of man and mammals that should be considered as sufficient reason for regarding this organism as an indication of pollution in the water, but more especially it predominance over other bacteria present in feces and sewage gives a sounder base to such an index.

There seems to be also sufficient reason to assume that Bacillus typhosus as well as Bacillus coli exists in polluted water. Epidemics of typhoid fever have been traced to the pollution of drinking water by the discharge of typhoid patients. Many methods for the detection of Bacillus typhosus have been recommended, Hiss, Copaldi and Proskauer, Von-Drigalski and Conradi, Jaksch and Rau, Ficker, Hoffman, Wurtz, Rodet, Chatemease and Widal, Vincet Pére, Elsner, Parietti, etc., etc. The list is too extensive even to mention the most important procedures. Each investigator advocates his own method, and I deem it unnecessary to describe the methods, but only to point out that the mere number of them is sufficient reason to assume that none at present can be regarded as certain and reliable. Further, whatever method we employ, we come to a final and constant technique which consists in the isola tion of the suspected colony and the differentiation and further study of the same on special media.

Since at the present time the litmus lactose agar culture medium is generally used in differentiation, in which Bacillus coli produces a pink colony and Bacillus typhosus a violet coloration, and further since the Parietti solution is also generally recommended, and used in many laboratories, I desire for the present to bring before you some observations on these two methods, leaving the consideration of the other methods for further contribution at present in preparation in our laboratory.

Sometime ago, I had the opportunity to compare the general counting of bacteria per c. c. in the same water on plain neutral agar and litmus lactose agar, and it was found that the litmus agar exerted

very decided restraining action on the growth of bacteria in the water in general. Since my first observation as a matter of corroboration, every sample of water examined at the Laboratory has been planted on both media, (plain agar and litmus lactose agar) and the number of colonies counted after forty-eight hours' incubation at 37 degrees C. The experiments have gone over several hundred, too long for enumeration in detail. The number of colonies which grew on litmus lactose agar was only 50 per cent. of the number which grew on plain agar, showing that litmus lactose agar has the power to restrain the growth of one-half of the organisms in water.

In some instances, no colonies grew on litmus lactose agar plates, while from one hundred to twelve hundred were present on plain agar. In a closer study of these results, it was suspected that such restraining action was common only to a certain kind of bacteria of no importance in the bacteriological examination of water from a sanitary point of view, as stated by the advocates of such medium. In extensive experiments with twenty-four and forty-eight hour old bouillon cultures of Bacillus typhosus and Bacillus coli, diluted in sterile H^2O, made simultaneously on plain and lactose litmus agar, to my surprise I found in general the percentage removal by litmus agar to be about thirty-four per cent. for Bacillus typhosus and about thirty per cent. for Bacillus coli. My next thought was whether the litmus could be more detrimental to a certain form of Bacillus typhosus and Bacillus coli (that is, would it be possible that in the life cycle of this organism there exists a certain age, the very young or the very old form, which was more sensitive to the litmus), and, with this point in mind, another series of experiments was made with Bacillus typhosus and Bacillus coli after two, three, four, six, twelve, twenty-four and forty-eight hours, as well as after five, ten, fifteen, and twenty days, and after one month incubation at 37 degrees C., and also at room temperature of bouillon cultures exposed to diffuse daylight. It was found that the removal by the litmus after one to five days was sixty per cent. for Bacillus coli and sixty-five per cent. for Bacillus typhosus, from ten to fifteen days it was about eighty per cent. for Bacillus coli and ninety per cent. for Bacillus typhosus, and from fifteen to twenty days or one month of incubation it was ninety-five per cent. removal for Bacillus typhosus. Further, one to five days old cultures will show from one to eight Bacillus coli and ten to 350 Bacillus typhosus colonies per c. c. on plain agar, and none on litmus agar; from five to ten days there were samples which will show from ten to eighteen Bacillus coli and eight to 560 Bacillus typhosus colonies per c. c. on plain agar and none on litmus agar; from ten to fifteen days samples will give as many as 6,000 Bacillus typhosus colonies per c.

c. on plain agar and none on litmus agar; and, finally, from fifteen days to one month old cultures, there will be samples giving from four to 20,000 Bacillus typhosus colonies on plain agar and none on litmus agar. The addition of one to two per cent. Parietti's solution and the amount of litmus tincture added to the medium was in direct proportion to its germicidal action on both organisms. The room temperature and exposure to diffuse daylight were more deterimental to Bacillus coli and Bacillus typhosus cultures. Von Drigalski and Conradi and Endo methods have been also investigated, and they have shown the same germicidal action as litmus and Parietti's solution; likewise other methods are under investigation to be considered in a further contribution.

These experiments show in the most positive manner the inaccuracy of our present technique and methods in the bacteriological examination of water, also show the gradual degeneration of Bacillus typhosus and the deterimental action of litmus and Parietti's solution upon the culture as it grows older. Such experiments demonstrate in the most logical manner the cause of our failure in detecting this organism in water. Now, if such degeneration of Bacillus typhosus has taken place under favorable conditions for its life, there is good reason to believe that it will be greater in the water, and the negative results which usually accompany a research for the Bacillus typhosus in water supplied to a comumnity where an epidemic of typhoid fever has just broken out, may, in the light of my results, be due to the fact that the organism is present at such a phase of its life cycle that it easily yields to the detrimental effect of litmus and Parietti's solution. This degeneration phase may of course be due to the biologic processes in water.

From the above results, it is logical to conclude not only that our present methods are at fault, but also that by using litmus and Parietti's solution, Von Drigalski or Endo medium, it seems as if we were working under the most exact technique to arrive at a negative result. This is especially the case for Bacillus typhosus. No doubt as a means of differentiation, all the above media are of more or less importance, but I believe their value as to the isolation of this micro-organism to be most uncertain.

The Bureau of Vital Statistics

WILMER R. BATT, M. D., State Registrar.

THE BUREAU OF VITAL STATISTICS.

POPULATION.

The estimated population (U. S. Census Office) of the State for the year 1907 was 7,032,915. The density of population for square mile of land area was increased from 155 (1906) to 156.8. The number of incorporated municipalities was increased by the creation of seven new boroughs. Five boroughs were absorbed by consolidation with cities or other boroughs. These changes, together with extensions of certain city and borough limits, to include portions of adjacent townships, have affected to some extent the distribution of urban and rural population. Based upon the facts of incorporation, the urban population constituted 66.1 per cent. and the rural population, 33.9 per cent. of the total.

The populations of all incorporated municipalities over 2,500 are given for the reason that the death rates per 1,000 of population for these places are mentioned in the mortality statistics. By stating from year to year the actual basis upon which these rates are computed an opportunity is given to make inquiry concerning the accuracy of the estimated population where abnormally high death rates exist.

Estimated populations for the minor municipalities, which may be liable to unusual increase must necessarily be more open to error than estimates for larger areas with established rates of growth.

Tables relating to the distribution of population by sex, age periods and nativity, are not repeated in this report for the reason that the percentage of distribution, for the year 1907, is not materially different from the rates for 1906.

TABLE 1.

Distribution of population according to certain groups with the percentage in each group to the total population.

Urban Population.	Numbers.	Per Cent. to Total Population.
Group 1 In municipalities of 500,000 and over,	1,466,408	20.8
Group 2 In municipalities between 100,000 and 500,000,	652,870	9.3
Group 3 In municipalities between 50,000 and 100,000,	272,557	3.9
Group 4 In municipalities between 25,000 and 50,000,	404,693	5.8
Group 5 In municipalities between 10,000 and 25,000,	494,773	7.0
Group 6 In municipalities between 5,000 and 10,000,	421,974	6.0
Group 7 In municipalities between 2,500 and 5,000,	393,843	5 6
Group 8 In municipalities less than 2,500,	541,649	7.7
Total urban population,	4,648,767	66.1
Group 9 In rural districts,	2,384,148	33.9

POPULATION OF INCORPORATED MUNICIPALITIES EXCEEDING 2,500 INHABITANTS.

Municipality.	Population.	Municipality.	Population.
Allegheny,	147,632	Catasaqua,	4,131
Allentown,	42 618	Chambersburg,	9,759
Altoona,	48,878	Charleroi,	5,930
Apollo,	3,423	Chester,	38,670
Archbald,	6,283	Clearfield,	6,922
Ashland,	6,438	Clifton Heights,	2,662
Ashley,	4,601	Coatesville,	7,048
Athens,	4,058	Columbia,	13,594
Austin,	2,704	Connellsville,	8,155
Avalon,	2,992	Conshohocken,	5,952
Avoca,	3,783	Coraopolis,	3,511
Bangor,	5,144	Corry,	5,369
Beaver,	2,865	Coudersport,	4,229
Beaver Falls,	10,277	Danville,	8,071
Bellefonte,	4,392	Darby,	3,726
Bellevue,	4,715	Derry,	2,593
Bellwood,	2,568	Dickson,	6,143
Berwick,	4,706	Dorranceton,	3,267
Bethlehem,	10,462	Doylestown,	3,369
Blairsville,	3,555	DuBois,	11,635
Blakely,	4,793	Dunmore,	15,571
Bloomsburg,	7,168	Duquesne,	12,067
Braddock,	19,812	Duryea,	5,000
Bradford,	16,834	East Conemaugh,	2,863
Bridgeport,	3,387	East Mauch Chunk,	3,905
Bristol,	7,462	Easton,	28,826
Butler,	12,336	East Pittsburg,	2,883
California,	2,920	East Stroudsburg,	3,187
Canonsburg,	3,105	Edwardsville,	6,388
Carbondale,	15,216	Elliott,	3,345
Carlisle,	11,032	Emporium,	2,668
Carnegie,	7,330	Erie,	61,202

Municipality.	Population.	Municipality.	Population.
Etna,	5,785	Mechanicsburg,	3,939
Exeter,	2,701	Media,	3,295
Ford City,	3,940	Middletown,	5,951
Forest City,	5,553	Millvale,	8,639
Frackville,	2,642	Milton,	6,733
Franklin,	8,029	Minersville,	5,667
Freeland,	7,545	Monongahela,	5,886
Galeton,	2,580	Mt. Carmel,	16,628
Gallitzin,	2,998	Mt. Pleasant,	5,401
Gettysburg,	3,673	Myersdale,	3,789
Gilberton,	4,819	Nanticoke,	13,565
Girardville,	3,719	Nazareth,	2,944
Greensburg,	10,585	New Brighton,	7,603
Greencastle,	4,072	New Castle,	38,464
Greenville,	5,498	New Kensington,	4,665
Hanover,	6,313	North Braddock,	6,535
Harrisburg,	56,663	Norristown,	23,995
Hazleton,	16,008	Northumberland,	2,750
Hollidaysburg,	3,012	Oakmont,	2,742
Homestead,	16,057	Oil City,	14,895
Honesdale,	2,898	Old Forge,	5,630
Huntingdon,	6,264	Olyphant,	7,541
Indiana,	5,558	Parnassus,	2,556
Jeannette,	7,535	Parsons,	2,605
Jermyn,	2,567	Patton,	2,651
Jersey Shore,	3,861	Pen Argyl,	3,233
Johnsonburg,	5,593	Perkasie,	2,677
Johnstown,	44,340	Philadelphia,	1,466,408
Kane,	6,805	Phillipsburg,	3,280
Kingston,	4,798	Phoenixville,	9,672
Kittanning,	4,427	Pitcairn,	2,601
Knoxville,	4,673	Pittsburg,	383,895
Lancaster,	48,073	Pittston,	14,132
Lansdale,	3,336	Plymouth,	16,664
Lansdowne,	3,771	Pottstown,	13,983
Lansford,	5,463	Pottsville,	16,823
Latrobe,	5,280	Punxsutawney,	8,405
Lebanon,	19,701	Quakertown,	3,563
Leechburg,	2,809	Rankin,	3,775
Lehighton,	5,715	Reading,	93,171
Lewisburg,	3,593	Renovo,	4,082
Lewistown,	5,216	Reynoldsville,	3,855
Lock Haven,	7,210	Ridgway,	4,563
Luzerne,	4,739	Rochester,	5,363
Lykens,	2,965	Royersford,	3,115
McDonald,	2,941	Sayre,	5,243
McKeesport,	44,851	Schuylkill Haven,	4,022
McKees Rocks,	9,384	Scottdale,	5,280
Mahanoy City,	15,057	Scranton,	121,343
Marietta,	2,513	Sewickley,	4,083
Mauch Chunk,	4,029	Shamokin,	20,861
Mayfield,	2,693	Sharon,	12,093
Meadville,	11,854	Sharpsburg,	8,106

Municipality.	Population.	Municipality.	Population
Sharpsville,	3,386	Tyrone,	6,589
Shenandoah,	23,386	Union City,	3,652
Sheridan,	2,948	Uniontown,	7,984
Shippensburg,	3,904	Warren,	11,044
Slatington,	4,560	Washington,	10,744
South Bethlehem,	15,298	Waynesboro,	6,426
South Fork,	3,531	Waynesburg,	2,832
South Williamsport,	3,606	Wellsboro,	2,954
Spring City,	3,066	West Chester,	10,573
St. Clair,	5,261	West Hazleton,	3,546
St. Marys,	5,953	West Newton,	2,585
Steelton,	14,197	West Pittston,	7,107
Stroudsburg,	4,120	West Washington,	2,693
Summit Hill,	3,097	Wilkes-Barre,	61,521
Sunbury,	11,162	Wilkinsburg,	17,849
Susquehanna,	3,813	Williamsport,	29,896
Tamaqua,	8,055	Williamstown,	3,331
Tarentum,	6,021	Wilmerding,	6,623
Taylor,	4,215	Windber,	6,000
Titusville,	8,363	Winton,	4,483
Towanda,	4,984	York,	40,077
Turtle Creek,	3,262		

MORTALITY.

With the completion of the second year of registration it is possible to present in these statistics certain comparisons which indicate the mortality movement (increase or decrease) from all causes and for certain important causes of death for the same areas within the State for two distinct and equal periods of time.

It is obvious that comparisons of this nature are less likely to contain fallacies than are comparisons between localities in which death rates may be influenced by unequal distribution of population by sex, age periods, color, nativity or occupation.

As Pennsylvania has taken place among the states admitted to the registration area of the United States Census Office, it is also possible to extend these comparisons over a territory including fifteen states and embracing 39.9 per cent. of the entire population of the United States which affords a comprehensive view of mortality movements in general and particularly in reference to epidemic and preventable diseases.

"Registration States" as designated by the Federal Government include only those states in which the collection of mortality statistics is considered to be sufficiently accurate to be worthy of consideration in tabulating mortality data. A glance at the states in-

cluded in this group will show that ten of them are contiguous, forming an unbroken area in the north eastern part of the United States, and that the remaining five form isolated areas with widely divergent conditions as to constitution and density of population, occupation and climate. The rates for individual states, rather than for the entire area, are, therefore, important in studying mortality movements. Pennsylvania's population comprises 21.3 per cent. of the total population in the registration states.

In the textual portion of the report, reference is made to certain causes of deaths, important either from sanitary considerations or by reason of their numerical strength. For this purpose the tables contained in the text are extracted from the general tables.

A total of 115,969 deaths occurred during the year. The number of deaths registered was 125,428 of which 9,459 were still births and, therefore, excluded from consideration in mortality statistics.

As compared with 1906, there was an increase of 1,534 in the total number of deaths. The death rate per 100,000 of population remained, however, the same, namely 16.5.

A comparison of the death rates for the states comprising the registration area is as follows:—

	1906.	1907.
Average rate,	16.1	16.4
California,	17.4	18.6
Colorado,	15.9	17.6
Connecticut,	16.7	17.1
Indiana,	12.5	12.5
Maine,	16.2	16.6
Maryland,	15.7	16.1
Massachusetts,	16.6	17.5
Michigan,	14.3	13.9
New Hamphire,	17.3	17.1
New Jersey,	16.2	16.6
New York,	17.1	17.5
Pennsylvania,	16.5	16.5
Rhode Island,	17.5	18.0
South Dakota,	8.8	9.8
Vermont,	16.8	16.2

From the above table it will be noted that the general death rate for the entire area increased .3 and that this increased rate extended to ten states, while but three states showed a slight decrease and in two states (including Pennsylvania) the rate remained stationary.

The urban rate including all incorporated municipalities was 17.5 and the rural rate 14.5. The greatest number of deaths occurred in January and the least number in June. The rates during the second and fourth quarters of the year were nearly identical.

Deaths by months and quarters with corresponding annual rates per 1,000 of population.

	By Months.		By Quarters.	
	Deaths.	Rates.	Deaths.	Rates.
January,	11,024	18.8		
February,	10,270	17.5	32,208	18.3
March,	10,914	18.5		
April,	9,754	16.6		
May,	9,036	15.4	27,110	15.4
June,	8,320	14.2		
July,	9,496	16.2		
August,	10,444	17.8	29,350	16.7
September,	9,410	16.0		
October,	8,797	15.0		
November,	8,459	14.4	27,300	15.5
December,	10,044	17.1		

Deaths of males numbered 63,891 and of females 52,078, giving a death rate per 1,000 of each sex living of 17.8 for males and 15.2 for females.

31.4 per cent. of all deaths occurred to children under five years of age and 22.6 per cent. to children under one year of age.

The death rate per 1,000 of the native population was 14.3, of native males 15.2 and of native females 13.3.

The death rate per 1,000 of the foreign population was 22.6 of foreign males 24.8 and of foreign females 19.9.

The death rate per 1,000 of whites was 16.1 and of blacks 28.2.

A comparison of the deaths at the various age periods between the years 1906 and 1907, shows a decided decrease in the death rate under five years of age for the latter year, also a decrease up to the age of twenty-five and a corresponding increase in subsequent ages.

A diminution of the death rate in the early ages with a stationary or ascending birth rate means that the average age at death is increasing and that more of our population is permitted to reach adult life. One of the most notable decreases in any particular cause is found in deaths from diarrhoea and enteritis (cholera infantum) in children under two years of age. 1,184 fewer deaths occurred from this affection in 1907 than 1906.

The infective diseases of childhood likewise show a marked decline. Compared with 1906, deaths from measles decreased 749, from whooping cough, 263 and from diphtheria 300.

Typhoid fever deaths also declined 379. Deaths from premature births and congenital affections were 1,486 less than in 1906.

Of the total number of deaths 10,866 occurred as the result of violence, 5,604 from congenital affections and 99,499 as the result of disease. Of the latter number 19,226, or 18.3 per cent. were due to preventable causes, a reduction of 3.0 per cent. as compared with 1906.

DEATH RATES AT CERTAIN AGE PERIODS.

Ages.	Death Rates per 1,000 Population of Corresponding Age.	
	1906	1907
Under 5,	48.5	44.7
5 to 14,	3.3	3.0
15 to 24,	6.1	6.0
25 to 34,	7.0	7.9
35 to 44,	10.1	10.9
45 to 54,	14.8	15.6
55 to 64,	30.2	30.5
65 to 74,	54.4	63.5
75 to 84,	133.4	140.8
85+,	282.9	308.6
Unknown,	25.3	8.0

DEATHS BY SEX AND AGE PERIODS.

Ages.	Deaths.			Per Cent. of Deaths at Each Age to Total at all Ages.			Death of males to 100 females.
	Total.	Males.	Females.	Total.	Males.	Females.	
All ages,	115,969	63,891	52,078	100.0	100.0	100.0	122
Under 1 year,	26,229	14,670	11,559	22.6	22.9	22.2	126
1 to 2 years,	5,527	2,931	2,596	4.7	4.6	5.0	112
2 to 3 years,	2,280	1,188	1,092	2.0	1.9	2.1	109
3 to 4 years,	1,379	745	634	1.2	1.1	1.2	117
4 to 5 years,	1,018	521	497	.9	.8	.9	107
Total under 5 years,	36,433	20,055	16,378	31.4	31.3	31.4	122
5 to 9 years,	2,710	1,408	1,302	2.3	2.2	2.5	108
10 to 14 years,	1,783	979	804	1.5	1.5	1.5	121
15 to 19 years,	3,429	1,828	1,421	2.8	2.9	2.7	128
20 to 24 years,	4,868	2,968	1,900	4.2	4.6	3.6	156
25 to 29 years,	4,887	2,959	1,928	4.2	4.6	3.6	151
30 to 34 years,	4,717	2,769	1,948	4.0	4.6	3.7	142
35 to 39 years,	4,997	3,032	1,965	4.3	4.8	3.7	154
40 to 44 years,	4,669	2,798	1,871	4.0	4.4	3.5	150
45 to 49 years,	4,751	2,808	1,943	4.1	4.3	3.7	144
50 to 54 years,	4,901	2,870	2,031	4.3	4.5	3.8	140
55 to 59 years,	5,263	2,951	2,312	4.5	4.6	4.4	127
60 to 64 years,	6,150	3,420	2,730	5.4	5.3	5.9	125
65 to 69 years,	6,510	3,418	3,092	5.6	5.3	5.9	110
70 to 74 years,	6,731	3,385	3,346	5.8	5.2	6.4	101
75 to 79 years,	5,933	2,899	3,034	5.2	4.6	5.8	95
80 to 84 years,	4,271	1,979	2,292	3.7	3.1	4.4	86
85 to 89 years,	2,199	968	1,231	1.9	1.6	2.4	78
90 to 94 years,	668	281	387	.6	.4	.7	72
95 years and over ..	172	52	120	.1	.1	.2	43
Unknown,	107	64	43	.1	.1	.1	150

A comparison of the death rates for the years 1906 and 1907, for the several population groups shows that the death rates declined in all municipalities over 100,000 population and also in all under 25,000. The death rates in municipalities between 25,000 and 100,000 show a slight increase. The highest death rate in any particular group was for boroughs having populations less than 2,500. This rate is indicative of the municipal neglect of sanitary affairs which usually exists in the municipalities of this size.

The increase in the rural rate is to be found in the number of deaths of old people, who form a large proportion of the rural population.

Death Rates for 1906 and 1907, for Certain Cities and Boroughs and Groups of Cities and Boroughs.

		1906.	1907.
Group 1.	Cities over 500,000,	19.3	18.8
	Philadelphia,	19.3	18.8
Group 2.	Cities between 100,000 and 500,000,	18.8	18.1
	Allegheny,	17.9	17.3
	Pittsburg,	19.9	19.2
	Scranton,	16.5	15.9
Group 3.	Cities between 50,000 and 100,000,	14.7	15.8
	Erie,	14.5	16.0
	Harrisburg,	14.8	15.3
	Reading,	14.5	15.3
	Wilkes-Barre,	14.9	17.0
Group 4.	Cities between 25,000 and 50,000,	17.4	17.6
	Allentown,	16.3	17.8
	Altoona,	15.0	14.1
	Chester,	15.5	15.2
	Easton,	15.7	16.4
	Johnstown,	16.9	16.1
	Lancaster,	14.7	12.7
	McKeesport,	19.9	19.7
	New Castle,	13.8	14.6
	Norristown,	25.6	26.1
	Williamsport,	16.4	18.9
	York,	14.8	16.1
Group 5.	Cities and boroughs between 10,000 and 25,000,	15.7	15.4
	Beaver Falls,	14.7	14.9
	Braddock,	23.0	23.6
	Bradford,	12.4	10.9
	Butler,	22.2	23.1
	Carbondale,	19.8	17.5
	Carlisle,	12.8	15.5
	Columbia,	11.6	11.8
	DuBois,	13.7	13.0
	Dunmore,	17.0	14.0
	Duquesne,	23.0	19.1
	Hazleton,	13.5	12.1
	Homestead,	19.2	19.0
	Lebanon,	15.7	14.0
	Mahanoy City,	20.3	15.6
	Meadville,	13.2	18.2
	Mt. Carmel,	12.8	15.1
	Nanticoke,	18.8	16.6
	Oil City,	12.0	11.6
	Pittston,	20.0	18.9
	Plymouth,	15.4	15.0
	Pottstown,	16.3	17.8
	Pottsville,	19.0	21.7

		1906.	1907.
	Shamokin,	14.1	12.0
	Sharon,	18.6	24.8
	Shenandoah,	24.3	19.7
	South Bethlehem,	19.1	19.1
	Steelton,	18.0	18.6
	Sunbury,	15.1	13.7
	Warren,	11.4	9.9
	West Chester,	21.0	23.4
	Wilkinsburg,	14.3	12.9
Group 6.	Cities and boroughs between 5,000 and 10,000 population,	17.7	17.2
	Archibald,	16.4	18.1
	Ashland,	14.0	14.6
	Bangor,	14.0	11.3
	Bethlehem,	19.0	15.5
	Bloomsburg,	13.2	14.3
	Bristol,	15.3	16.6
	Carnegie,	24.0	18.0
	Chambersburg,	17.6	14.6
	Charleroi,	20.5	16.0
	Clearfield,	12.0	15.7
	Coatesville,	27.3	24.9
	Connellsville,	22.1	19.5
	Conshohocken,	18.2	17.5
	Corry,	17.8	16.0
	Danville,	14.2	17.3
	Dickson City,	17.7	20.0
	Edwardsville,	20.0	22.0
	Etna,	15.7	15.8
	Forest City,	16.3	17.0
	Franklin,	16.0	13.2
	Freeland,	10.0	10.0
	Greensburg,	29.6	21.6
	Greenville,	13.2	15.2
	Hanover,	17.9	13.9
	Huntingdon,	16.1	14.6
	Indiana,	14.7	13.3
	Jeannette,	12.5	10.6
	Johnsonburg,	10.2	9.0
	Kane,	12.8	13.7
	Lansford,	20.3	19.0
	Latrobe,	17.0	24.6
	Lehighton,	11.9	9.3
	Lewistown,	25.6	21.8
	Lock Haven,	18.1	17.0
	McKees Rocks,	29.3	24.0
	Middletown,	13.6	14.6
	Millvale,	17.2	11.9
	Milton,	13.0	13.8
	Minersville,	16.2	18.0
	Monongahela,	16.8	18.3
	Mt. Pleasant,	18.8	24.2
	New Brighton,	15.9	17.2

		1906.	1907.
	North Braddock,	38.2	25.8
	Old Forge,	25.0	31.2
	Olyphant,	14.4	14.3
	Phoenixville,	20.0	20.3
	Punxsutawney,	23.8	14.9
	Rochester,	25.2	23.3
	Sayre,	22.8	23.8
	Scottdale,	11.1	13.1
	Sharpsburg,	13.4	14.1
	St. Clair,	24.5	18.2
	St. Marys,	10.3	11.4
	Tamaqua,	13.6	13.8
	Tarentum,	15.2	17.6
	Titusville,	13.6	14.8
	Tyrone,	11.0	14.1
	Uniontown,	29.4	30.4
	Washington,	27.1	21.2
	Waynesboro,	14.1	16.5
	West Pittston,	11.2	11.8
	Wilmerding,	15.2	14.0
Group 7.	All cities and boroughs between 2,500 and 5,000,	14.1	11.8
Group 8.	Boroughs under 2,500,	20.1	20.0
Group 9.	Rural listricts,	13.2	14.4

COMPARISON OF DEATHS BY AGE PERIODS.

	1906.	1907.
All ages,	114,435	115,969
Under 1 year,	27,908	26,229
1 to 2 years,	6,125	5,527
2 to 3 years,	2,395	2,280
3 to 4 years,	1,463	1,379
4 to 5 years,	1,060	1,018
Total number under 5 years,	38,951	36,433
5 to 9 years,	2,916	2,710
10 to 14 years,	1,897	1,783
15 to 19 years,	3,402	3,249
20 to 24 years,	4,744	4,868
25 to 29 years,	4,779	4,887
30 to 34 years,	4,562	4,717
35 to 39 years,	4,771	4,997
40 to 44 years,	4,199	4,669
45 to 49 years,	4,457	4,751
50 to 54 years,	4,559	4,901
55 to 59 years,	4,911	5,263
60 to 64 years,	5,571	6,150
65 to 69 years,	6,026	6,510
70 to 74 years,	6,130	6,731
75 to 79 years,	5,602	5,933
80 to 84 years,	3,861	4,271

	1906.	1907.
85 to 89 years,	1,972	2,199
90 to 94 years,	639	668
95 years,	154	172
Unknown,	332	107

TYPHOID FEVER.

Deaths from typhoid fever numbered 3,538. The death rate per 100,000 of population was 50.3. Compared with 1906, the deaths from this cause decreased 379 and the death rate decreased 6.5 per 100,000. With the single exception of tuberculosis, no other communicable disease presented such a high mortality.

The case rate mortality for the year was 17.6, a slight increase over 1906, thus further emphasizing the statement made in the report for that year, that the accredited percentage of mortality as popularly assigned to typhoid fever is entirely too low when applied to areas embracing a large rural population such as exists in Pennsylvania.

The case rate mortality in urban districts was 15.8 and in rural districts 33.5.

A comparison of the death rates from typhoid fever for 1906 and 1907 in the states composing the registration area of the U. S. Census Office is as follows:—

RATES PER 100,000 OF POPULATION.

	1906.	1907.
Average rate,	31.6	29.1
California,	39.6	32.5
Colorado,	56.0	63.7
Connecticut,	22.1	20.5
Indiana,	35.9	34.6
Maine,	18.5	17.7
Maryland,	40.5	40.3
Massachusetts,	16.1	12.9
Michigan,	27.8	22.7
New Hampshire,	21.0	11.9
New Jersey,	16.8	18.9
New York,	19.3	20.3
Pennsylvania,	56.5	50.3
Rhode Island,	16.5	11.0
South Dakota,	21.0	19.5
Vermont,	19.4	10.8

From the foregoing table it appears that while Pennsylvania's typhoid rate is considerably above the average rate in the registration area, it, however, decreased 5.2 between 1906 and 1907, although the average rate for the same period declined but 2.5.

In the contiguous states of New York and New Jersey, the rates increased 1.0 and 2.1 respectively.

The percentage of cases of typhoid fever to total cases and percentage of deaths to total deaths by months for the year 1906 and 1907.

	Percentage of Cases to Total Cases.		Percentage of Deaths to Total Deaths.	
	1906	1907	1906	1907
January,	8.9	15.4	9.3	13.4
February,	9.4	10.9	8.4	10.5
March,	7.7	5.8	7.9	8.3
April,	8.8	5.6	10.0	6.8
May,	7.6	4.9	8.8	6.7
June,	4.9	5.2	5.1	5.0
July,	5.6	5.3	5.7	5.0
August,	8.3	9.2	7.8	7.5
September,	9.6	9.7	8.9	10.5
October	9.8	10.5	9.4	9.8
November,	7.8	9.7	8.7	8.3
December,	11.6	7.8	10.0	8.2

Deaths from Typhoid Fever by Sex and Age Periods for 1907 Compared with 1906.

	1906.	1907.
Total,	3,917	3,538
Males,	2,393	2,152
Females,	1,524	1,386
Ages—		
Under 1 year,	16	17
1 to 2 years,	38	19
2 to 3 years,	38	30
3 to 4 years,	44	42
4 to 5 years,	43	34
Total under 5 years,	179	142
5 to 9 years,	234	155
10 to 14 years,	255	221
15 to 19 years,	545	515
20 to 24 years,	767	663
25 to 29 years,	559	524
30 to 34 years,	377	355
35 to 39 years,	294	291
40 to 44 years,	210	187
45 to 49 years,	137	154
50 to 54 years,	120	113
55 to 59 years,	110	80
60 to 64 years,	55	51
65 to 69 years,	38	40
70 to 74 years,	29	30
75 to 79 years,	13	13
80 to 84 years,	5	3
85 to 89 years,	2	0
Unknown,	7	1

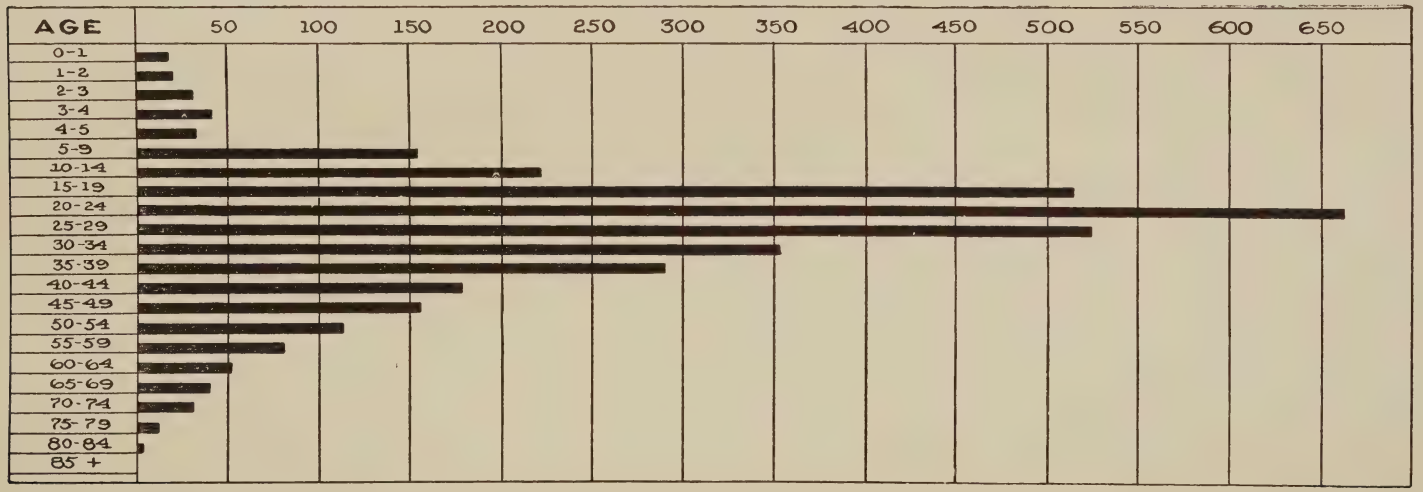


Diagram showing the comparative mortality from Typhoid Fever by the number of decedents at each age period.

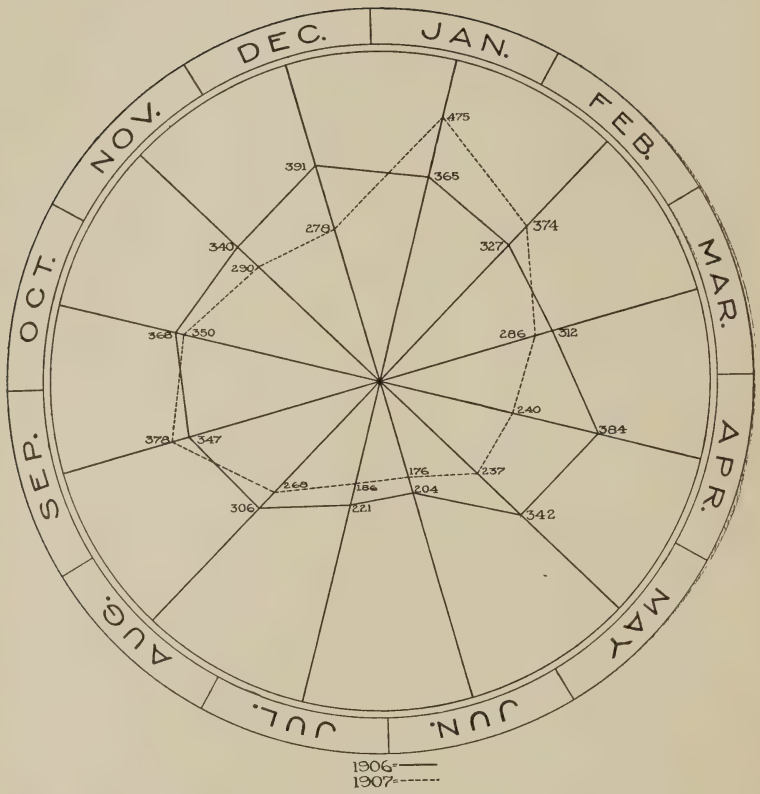


Diagram showing the comparative mortality from Typhoid Fever for the years 1906 and 1907, by the number of decedents for each year by months The increase shown for January and February in 1907 was due to the Scranton epidemic.

DEATHS FROM TYPHOID FEVER BY MONTHS FOR THE YEARS 1906 AND 1907.

	Total.		Urban.		Rural.	
	1906	1907	1906	1907	1906	1907
January,	365	475	312	413	53	62
February,	327	374	285	328	42	46
March,	312	286	265	233	47	53
April,	394	240	331	208	63	32
May,	342	237	289	197	53	40
June,	204	176	180	147	24	29
July,	221	186	192	154	29	32
August,	306	268	255	228	51	40
September,	347	378	251	271	96	107
October,	368	350	262	257	106	93
November,	340	290	256	204	84	86
December,	391	278	332	227	59	51

The increase in the number of deaths in the early months of 1907, as compared with 1906, was due to the mortality resulting from the Scranton epidemic.

The cities and boroughs with populations exceeding 5,000 in which the death rate exceeded the average State rate (50.3) were as follows:—

Allegheny,	99.9	Meadville,	50.6
Allentown,	51.6	Millvale,	69.4
Altoona,	57.2	Monongahela,	84.9
Beaver Falls,	87.5	Mount Pleasant,	80.0
Braddock,	146.3	New Brighton,	144.6
Butler,	105.4	New Castle,	72.7
Charleroi,	67.4	Philadelphia,	60.7
Connellsville,	85.8	Phoenixville,	134.4
Danville,	99.1	Pittsburg,	130.7
DuBois,	77.3	Pittston,	64.3
Duquesne,	74.5	Punxsutawney,	71.3
Erie,	78.4	Rochester,	279.6
Etna,	53.5	Sayre,	114.4
Huntingdon,	79.7	Scranton,	75.8
Indiana,	107.7	Sharon,	198.4
Johnsonburg,	107.2	Steelton,	63.3
Kane,	88.1	Sunbury,	71.6
Latrobe,	113.6	Tarentum,	149.4
Lewistown,	134.2	Uniontown,	325.6
Lock Haven,	83.2	West Chester,	123.8
McKeesport,	95.8	Williamsport,	70.0
McKees Rocks,	106.5		

DIPHTHERIA.

Deaths from diphtheria numbered 2,138. The death rate per 100,000 of population was 30.4. As compared with 1906, deaths decreased 300 and the death rate declined 4.8.

A comparison of the death rates from diphtheria for 1906 and 1907, in the states comprising the registration area is as follows:—

	Rates per 100,000 of population.	
	1906.	1907.
Average rate,	26.9	25.0
California,	14.3	22.3
Colorado,	15.1	21.5
Connecticut,	27.4	24.9
Indiana,	14.9	12.7
Maine,	16.2	16.7
Maryland,	25.7	15.3
Massachusetts,	25.4	24.9
Michigan,	18.1	15.9
New Hampshire,	21.0	22.2
New Jersey,	31.0	30.8
New York,	32.7	30.5
Pennsylvania,	35.2	30.4
Rhode Island,	25.7	24.8
South Dakota,	12.2	16.8
Vermont,	19.7	10.5

From the foregoing table it appears that the rate for the entire area decreased 1.9 and for Pennsylvania 4.8. The rates in the adjoining states of New York and New Jersey are respectively 0.1 and 0.8 higher than the Pennsylvania rate.

Death from Diphtheria by Months for	1906.	1907.
Total,	2,438	2,138
January,	266	255
February,	213	165
March,	205	145
April,	159	139
May,	157	125
June,	85	99
July,	89	82
August,	116	118
September,	210	167
October,	318	267
November,	308	276
December,	312	256

The case rate mortality for the year was 20.3, a reduction of 2.1 as compared with the previous year. This rate was maintained with

marked regularity throughout the year. The influence of school life is illustrated by the diagram showing the marked preponderance of cases during the school months as well as by reference to the table showing the ages of the decedents.

DEATH FROM DIPHTHERIA BY SEX AND AGE PERIODS FOR 1906 and 1907.

	1906.	1907.
Total,	2,438	2,138
Males,	1,214	1,115
Females,	1,224	1,023
Under 1 year,	173	170
1 to 2 years,	373	351
2 to 3 years,	363	337
3 to 4 years,	319	267
4 to 5 years,	303	248
Total, under 5 years,	1,531	1,373
5 to 9 years,	648	529
10 to 14 years,	144	119
15 to 19 years,	44	48
20 to 24 years,	18	22
25 to 29 years,	15	11
30 to 34 years,	14	8
35 to 39 years,	8	6
40 to 44 years,	3	4
45 to 49 years,	4	2
50 to 54 years,	2	5
55 to 59 years,	0	2
60 to 64 years,	0	2
65 to 69 years,	4	3
70 to 74 years,	2	2
Unknown,	1	2

CASE RATE MORTALITY BY MONTHS 1906-1907.

	1906.	1907.
Entire State (year),	22.4	20.3
January,	25.5	23.6
February,	24.0	20.0
March,	23.9	18.8
April,	22.6	18.8
May,	22.1	21.7
June,	15.4	17.9
July,	20.3	17.3
August,	27.3	19.8
September,	21.1	20.9
October,	20.0	20.7
November,	21.1	18.7
December,	25.6	19.6

SCARLET FEVER.

Scarlet fever caused 657 deaths during the year. This was an increase of 80 as compared with the previous year. The death rate per 100,000 of population was 9.3 an increase of 1.0 over 1906. The increased number of deaths in 1907, was not due so much to a large increase in the number of cases (but 29 more cases were reported than in 1906) but rather to an increased malignancy in the type of the disease.

A comparison of the death rates from scarlet fever in the states composing the registration area shows that Pennsylvania was not alone in this respect, there being an increase of 2.1 in the average rate for this area. The most notable increases being Colorado 20.3; Massachusetts 5.4; New Jersey 4.4; New York 3.7; Rhode Island 12.1.

These rates are as follows:—

	Rates per 100,000 of population.	
	1906.	1907.
Average rate,	7.5	9.6
California,	3.2	4.4
Colorado,	16.2	36.5
Connecticut,	5.8	6.5
Indiana,	4.1	3.6
Maine,	0.7	2.0
Maryland,	6.0	2.3
Massachusetts,	4.7	10.1
Michigan,	9.0	6.5
New Hampshire,	3.5	2.1
New Jersey,	9.5	13.9
New York,	9.2	21.9
Pennsylvania,	8.3	9.3
Rhode Island,	16.3	28.4
South Dakota,	4.7	4.2
Vermont,	2.9	2.3

DEATHS FROM SCARLET FEVER BY AGE PERIODS FOR 1906 AND 1907.

	1906.	1907.
Total,	577	657
Males,	270	326
Females,	307	331
Under 1 year,	43	26
1 to 2 years,	69	50
2 to 3 years,	90	100
3 to 4 years,	92	89
4 to 5 years,	62	79
Total under 5 years,	356	394
5 to 9 years,	171	192

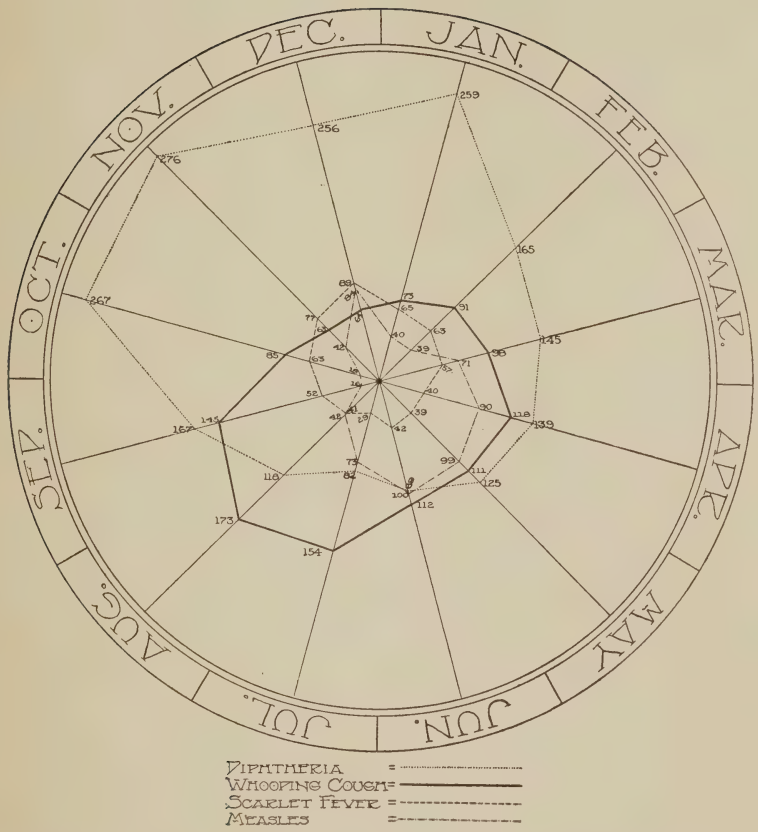


Diagram showing the comparative mortality from Diphtheria, Whooping Cough, Scarlet Fever and Measles by the number of decedents from each cause by months.

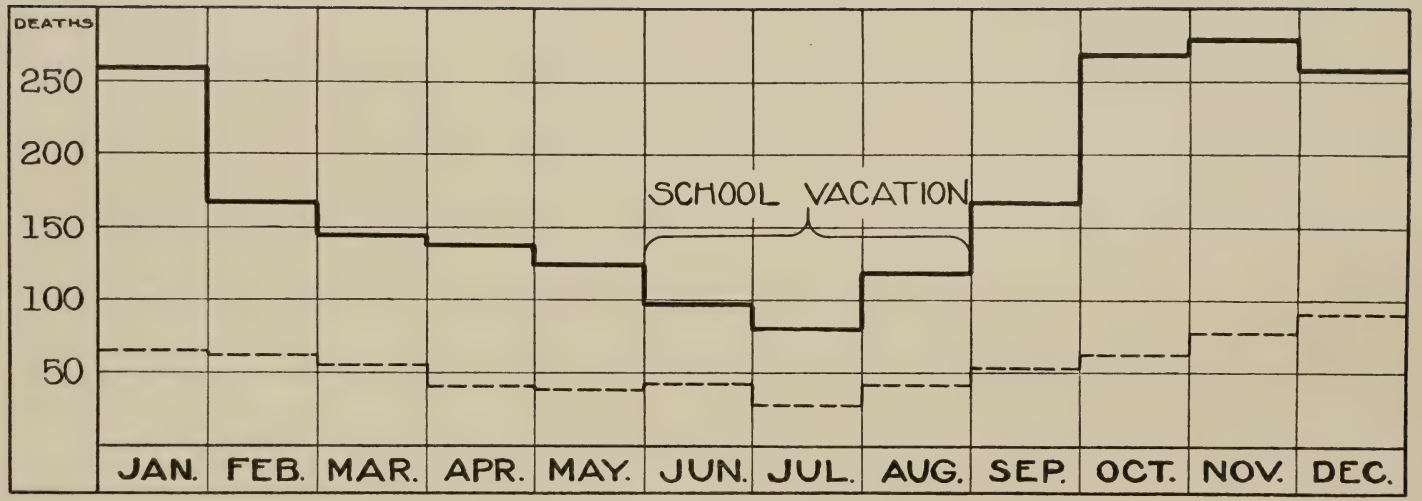


Diagram showing the deaths from Diphtheria and Scarlet Fever by months and the influence of school attendance.

10 to 14 years,	23	38
15 to 19 years,	11	11
20 to 24 years,	5	10
25 to 29 years,	5	5
30 to 34 years,	4	3
Over 35 years,	1	4
Unknown,	1	0

DEATHS FROM SCARLET FEVER BY MONTHS FOR 1906 AND 1907.

	1906.	1907.
Total,	577	657
January,	51	65
February,	62	63
March,	59	57
April,	67	40
May,	72	39
June,	32	42
July,	38	29
August,	28	41
September,	34	52
October,	33	63
November,	53	77
December,	48	89

The case rate mortality in 1906 was 7.5 and in 1907 it was 8.5.

MEASLES.

Deaths from measles numbered 714, a decrease of 749 as compared with 1906. The death rate per 100,000 of population as 10.2 a decline of 10.9 from the previous year.

A comparison of the deaths in the registration states for two years is as follows:—

	Rates per 100,000 of population.	
	1906.	1907.
Average rate,	13.2	9.9
California,	10.1	10.9
Colorado,	3.4	30.7
Connecticut,	15.3	6.8
Indiana,	2.8	8.2
Maine,	15.8	4.5
Maryland,	5.6	10.5
Massachusetts,	11.0	8.7
Michigan,	9.9	9.4
New Hampshire,	3.7	4.6
New Jersey,	10.2	6.6
New York,	15.3	11.6
Pennsylvania,	21.1	10.2

	1906.	1907.
Rhode Island,	24.9	6.2
South Dakota,	5.6	11.3
Vermont,	8.8	2.6

DEATHS FROM MEASLES BY SEX AND AGE PERIODS FROM 1906 AND 1907.

	1906.	1907.
Total,	1,463	714
Males,	785	380
Females,	678	334
Under 1 year,	366	206
1 to 2 years,	478	231
2 to 3 years,	210	112
3 to 4 years,	116	48
4 to 5 years,	70	31
Total under 5 years,	1,240	628
5 to 9 years,	129	51
10 to 14 years,	28	9
15 to 19 years,	19	4
20 to 24 years,	16	8
25 to 29 years,	5	2
30 to 34 years,	4	2
35 to 39 years,	7	3
40 to 44 years,	3	2
45 to 49 years,	4	4
50 years and over,	5	1

WHOOPING COUGH.

1,287 deaths occurred from whooping cough during the year. This was a reduction of 263 as compared with 1906. The death rate per 100,000 of population was 18.3 a reduction of 4.1 as compared with the previous year. The death rates from this disease compared with similar rates for the registration states are as follows:—

	Rates per 100,000 of population.	
	1906.	1907.
Average rate,	16.5	11.7
California,	5.9	8.4
Colorado,	15.3	7.8
Connecticut,	20.9	12.9
Indiana,	12.0	5.9
Maine,	13.6	9.9
Maryland,	30.2	11.0

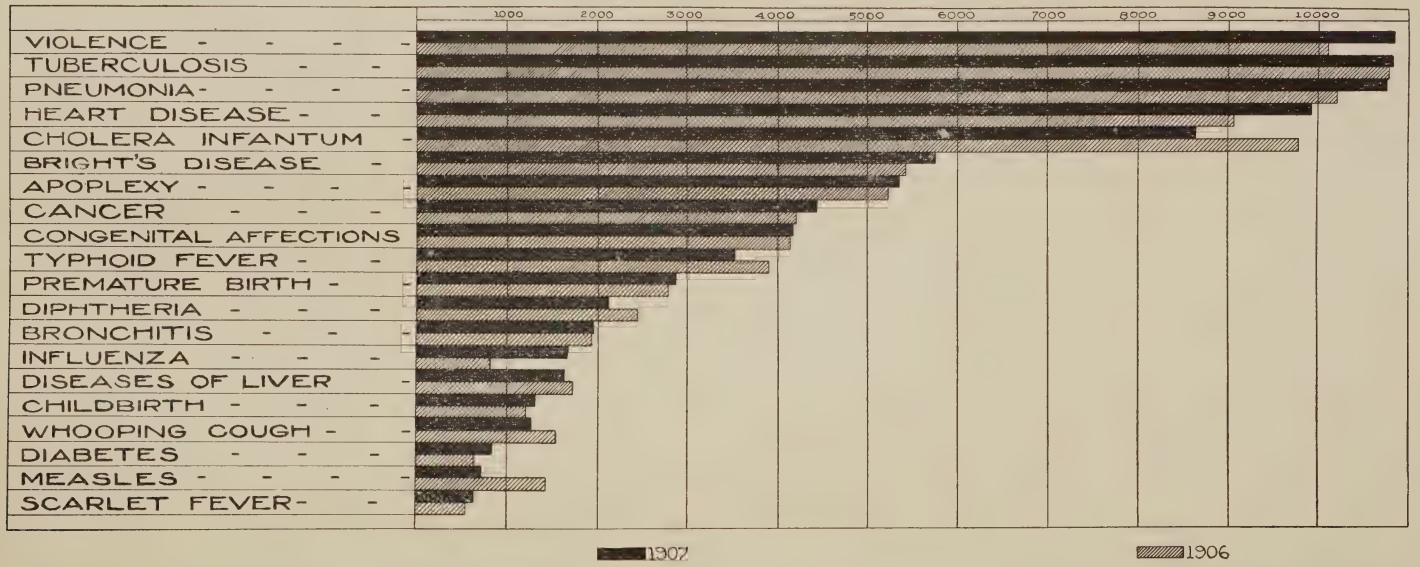


Diagram showing the comparative mortality from twenty principal causes of death for the years 1906 and 1907, by the number of decedents from each cause.

	1906.	1907.
Massachusetts,	23.1	11.1
Michigan,	17.8	8.2
New Hampshire,	19.0	15.1
New Jersey,	16.7	10.6
New York,	9.9	9.1
Pennsylvania,	22.4	18.3
Rhode Island,	19.0	17.0
South Dakota,	19.3	28.7
Vermont,	6.6	14.8

DEATHS FROM WHOOPING COUGH BY SEX AND AGE PERIODS FOR 1906. and 1907.

	1906.	1907.
Total,	1,550	1,287
Males,	679	612
Females,	871	675
Under 1 year,	881	731
1 to 2 years,	251	338
2 to 3 years,	135	114
3 to 4 years,	83	52
4 to 5 years,	58	25
Total under 5 years,	1,491	1,260
5 to 9 years,	51	20
Over 10 years,	6	7
Unknown age,	2	0

56.8 per cent. of the deaths occurred to children under one year of age and 97.8 to children under five years of age.

In contradistinction to the other epidemic diseases of childhood which occur most frequently during the school term of the year, 35.4 per cent. of the deaths from whooping cough occurred during the summer months and during the interim of school attendance.

DEATHS FROM WHOOPING COUGH BY MONTHS.

January,	73	July,	154
February,	91	August,	173
March,	98	September,	145
April,	118	October,	85
May,	111	November,	63
June,	112	December,	64

TUBERCULOSIS.

Deaths from tuberculosis in all forms numbered 10,825, an increase of 45 over the year 1906. Of this number 9,317 were due to tuberculosis of the lungs and 1,508 to tuberculosis in other forms. The

forms of tuberculosis represented with the percentage in each class to total deaths from this cause are as follows:—

Tuberculosis of lungs,	9,317	86.1 per cent.
Tuberculosis of larynx,	99	0.9 per cent.
Tuberculous meningitis,	525	4.9 per cent.
Abdominal tuberculosis,	451	4.1 per cent.
Potts disease,	82	0.7 per cent.
Tuberculous abscess,	10	0.1 per cent.
White swelling,	41	0.4 per cent.
Tuberculosis of other organs,	107	1.0 per cent.
General tuberculosis,	193	1.8 per cent.

The death rate from tuberculosis in all forms per 100,000 of population was 153.9 and of tuberculosis of the lungs 132.4.

This was a decrease of 1.2 in the rates of pulmonary tuberculosis as compared with the preceding year.

The comparison with the states composing the registration area for the years 1906 and 1907, is as follows:—

DEATHS PER 100,000 OF POPULATION FROM TUBERCULOSIS OF THE LUNGS.

	1906.	1907.
Average rate,	155.4	155.1
California,	231.5	244.1
Colorado,	252.9	267.7
Connecticut,	136.5	149.8
Indiana,	141.2	140.2
Maine,	131.8	134.3
Maryland,	180.6	177.7
Massachusetts,	155.6	157.5
Michigan,	90.1	88.7
New Hampshire,	129.2	111.2
New Jersey,	171.1	170.6
New York,	175.3	171.6
Pennsylvania,	133.6	123.5
Rhode Island,	166.2	163.6
South Dakota,	83.9	86.2
Vermont,	113.6	107.0

DEATHS FROM TUBERCULOSIS OF THE LUNGS BY SEX AND AGE PERIODS.

	1906.	1907.
Total,	9,258	9,317
Males,	4,786	4,896
Females,	4,472	4,421
Under 1 year,	212	239
1 to 2 years,	103	96
2 to 3 years,	56	51
3 to 4 years,	29	36
4 to 5 years,	27	23
Total under 5 years,	427	445
5 to 9 years,	89	92

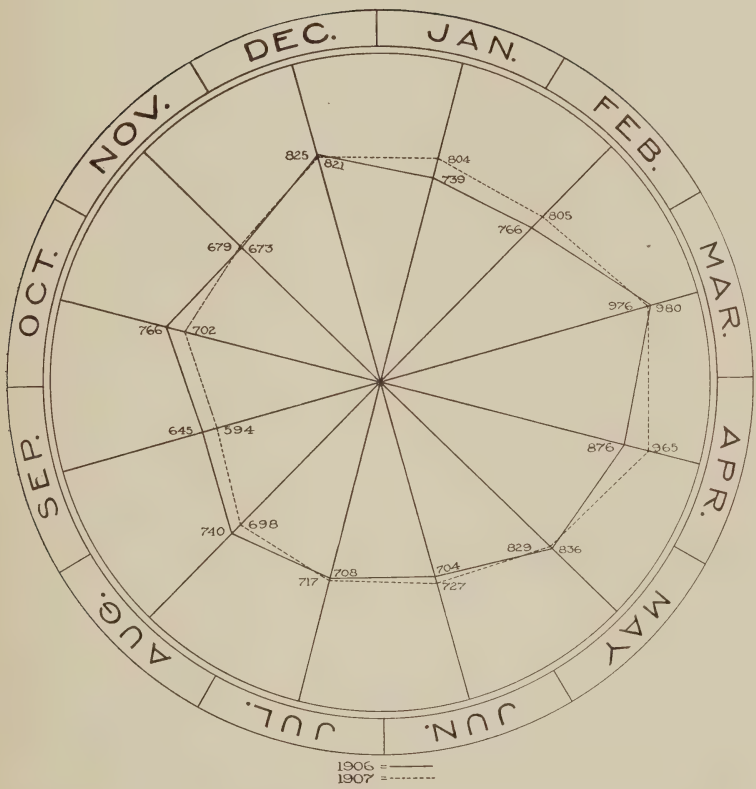


Diagram showing the comparative mortality from Tuberculosis of the lungs for the years 1906 and 1907, by the number of decedents for each year by months

	1906.	1907.
10 to 14 years,	166	174
15 to 19 years,	734	679
20 to 24 years,	1,207	1,207
25 to 29 years,	1,249	1,175
30 to 34 years,	1,129	1,112
35 to 39 years,	1,035	1,014
40 to 44 years,	732	791
45 to 49 years,	617	552
50 to 54 years,	473	516
55 to 59 years,	404	408
60 to 64 years,	319	383
65 to 69 years,	243	261
70 to 74 years,	194	213
75 to 79 years,	118	133
80 to 84 years,	33	39
85 years and over,	14	16
Unknown,	25	7

The quinquennial age periods showing an actual decrease in the number of deaths are 15 to 19 years, 30 to 34, 35 to 39 and 45 to 49.

DEATHS FROM TUBERCULOSIS OF THE LUNGS BY MONTHS.

	1906.	1907.
Total,	9,258	9,317
January,	739	804
February,	766	805
March,	980	976
April,	876	965
May,	836	829
June,	704	727
July,	708	717
August,	740	698
September,	645	594
October,	766	702
November,	673	679
December,	825	821

OCCUPATIONAL MORTALITY OF TUBERCULOSIS OF THE LUNGS.

Of the 4,896 deaths from tuberculosis of the lungs among males, 346 were under occupational age and 800 were returned as having no occupations. Of the 3,750 deaths in which definite occupations were assigned, 317 were scattered through a variety of occupations in such small numbers as to be of slight significance.

The following table shows the death rates in each ten thousand persons employed in certain occupations and groups of occupations of similar character:—

Architects, artists and teachers of art,	7.5
Bakers and confectioners,	24.4
Bankers and brokers,	9.2
Barbers and hairdressers,	45.2

Blacksmiths,	12.0
Boatmen and canalmen,	6.0
Bookkeepers, clerks and copyists,	33.0
Boot and shoemakers,	22.1
Brewers, distillers and rectifiers,	34.5
Butchers,	18.1
Cabinetmakers and upholsterers,	22.2
Carpenters and joiners,	19.3
Cigarmakers and tobacco workers,	31.5
Clock and watch repairs and jewelers,	87.5
Clergymen,	5.9
Collectors and agents,	39.0
Commercial travelers,	2.2
Compositors, printers and pressmen,	28.0
Coopers,	27.2
Draymen, hackmen and teamsters,	26.2
Engineers and surveyors,	13.7
Engineers and firemen (not railway),	17.3
Farmers and farm laborers,	6.6
Gardeners, florists and nurserymen,	28.2
Glass blowers and glass workers,	18.3
Hat and capmakers,	74.4
Hotel and boarding housekeepers,	15.1
Hucksters and peddlers,	21.1
Iron and steelworkers,	16.6
Journalists,	18.0
Janitors,	16.8
Laborers (not agricultural),	33.2
Lawyers,	8.5
Leatherworkers,	11.8
Livery, stablekeepers and hostlers,	18.1
Lumbermen,	5.0
Machinists,	21.4
Marble and stone cutters,	63.4
Masons,	16.5
Merchants,	11.8
Mill and factory operators (textile),	30.7
Millers, flour and grist,	12.9
Miners,	10.3
Musicians and teachers of music,	33.2
Physicians,	17.5
Painters,	30.1
Plasterers,	30.8
Plumbers, gas and steam fitters,	28.1
Policemen and watchmen,	18.0
Saloonkeepers and bartenders,	29.4
Steam railroad employes,	9.3
Sailors,	44.1
Servants,	37.1
Tailors,	20.6
Teachers (school),	7.0
Tinners and tinwaremakers,	19.3

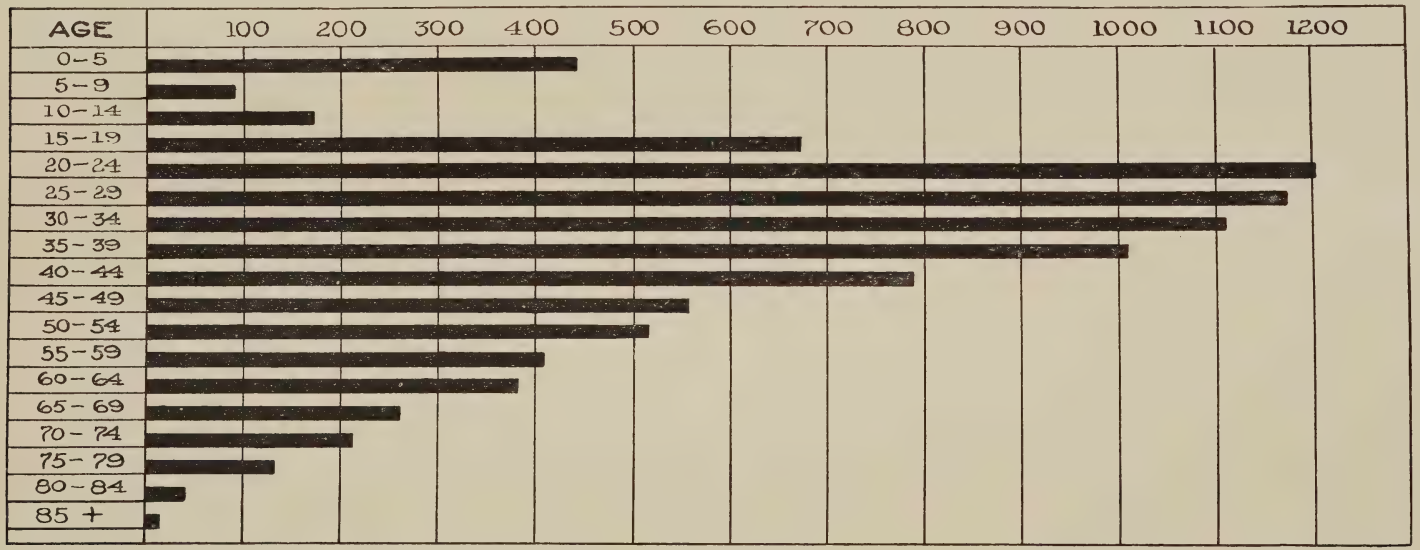


Diagram showing the comparative mortality from Tuberculosis of the Lungs by the number of decedents at each age period.

Of the 4,421 deaths from tuberculosis of the lungs among females, 365 were under occupational age, 3,591 were returned as without occupation (the term housewife employed on many of these returns not being considered) and but 465 were assigned definite occupations.

CANCER.

Deaths from cancer numbered 4,420, an increase of 212 as compared with 1906.

The form of cancer represented in this total are as follows:—

	1906.	1907.
Cancer of the mouth,	160	144
Cancer of the stomach and liver,	1,620	1,666
Cancer of the intestines,	440	488
Cancer of female genital organs,	595	640
Cancer of the breast,	399	368
Cancer of the skin,	160	188
Cancer of other and unspecified organs,	834	926

The rates per 100,000 of population for the years 1906 and 1907, were 60.7 and 62.8 respectively. These rates compared with similar rates in the registration area as follows:—

RATES PER 100,000 OF POPULATION—1906.

Average rate,	70.9
California,	92.0
Colorado,	51.3
Connecticut,	80.6
Indiana,	53.7
Maine,	86.2
Maryland,	60.1
Massachusetts,	90.3
Michigan,	67.6
New Hampshire,	89.2
New Jersey,	66.1
New York,	76.2
Pennsylvania,	60.7
Rhode Island,	78.3
South Dakota,	35.4
Vermont,	85.3

As cancer is almost universally a disease of middle or later adult life any deficiency in population in the early age periods would very materially affect the death rates from this disease. In this connection it is interesting to note that the New England states, with the exception of California, furnish the highest death rates.

It would seem to be evident from statistical records that the mortality from cancer is steadily increasing, not only in the United States, but throughout the world. It is possible that increasing accuracy in diagnosis may be responsible for a portion of this increase but an inspection of the returns from our larger cities for a number of years shows a decided and constant growth in the returns of deaths from this cause. It is unfortunate that the returns of cancer of other and unspecified organs continues to be so large (20.9).

Physicians to whom statistics upon the subject should be of the greatest value, defeat the object of a more detailed classification by failure in very many cases to definitely specify the locality or organ effected and what would be of even greater value, the variety or character of the neoplasm.

DISEASES OF THE NERVOUS SYSTEM.

The total number of deaths due to diseases of the nervous system was 12,227, an increase of 347 over 1906. The death rate per 100,000 of population was 173.8. 53.5 per cent. of the deaths occurred to males and 46.5 to females. The most important individual causes of death in this group were apoplexy, meningitis and convulsions in children. As the title of apoplexy includes congestion of the brain a reference to the table showing the number of deaths from each specified cause by age periods will indicate the futility of attempting to deduct conclusions as to the individual mortality of apoplexy. "Meningitis" and "convulsions" as returns are so indefinite in character as to be of small value except for the evidence which they present either of carelessness in diagnosis or statement of the cause of death.

DISEASES OF THE CIRCULATORY SYSTEM.

11,777 deaths occurred from diseases of the circulatory system, an increase of 1,090 as compared with 1906. The death rate per 100,000 of population increased from 154.2 to 167.4. Heart disease was responsible for 9,282 of the deaths in this group. Deaths of males from this latter cause numbered 4,984 and of females 4,388. By reference to General Table No. 2, it will be found that the greatest percentage of deaths occurred to persons in the advanced years of life. The death rates from this cause show a tendency to increase throughout the United States.

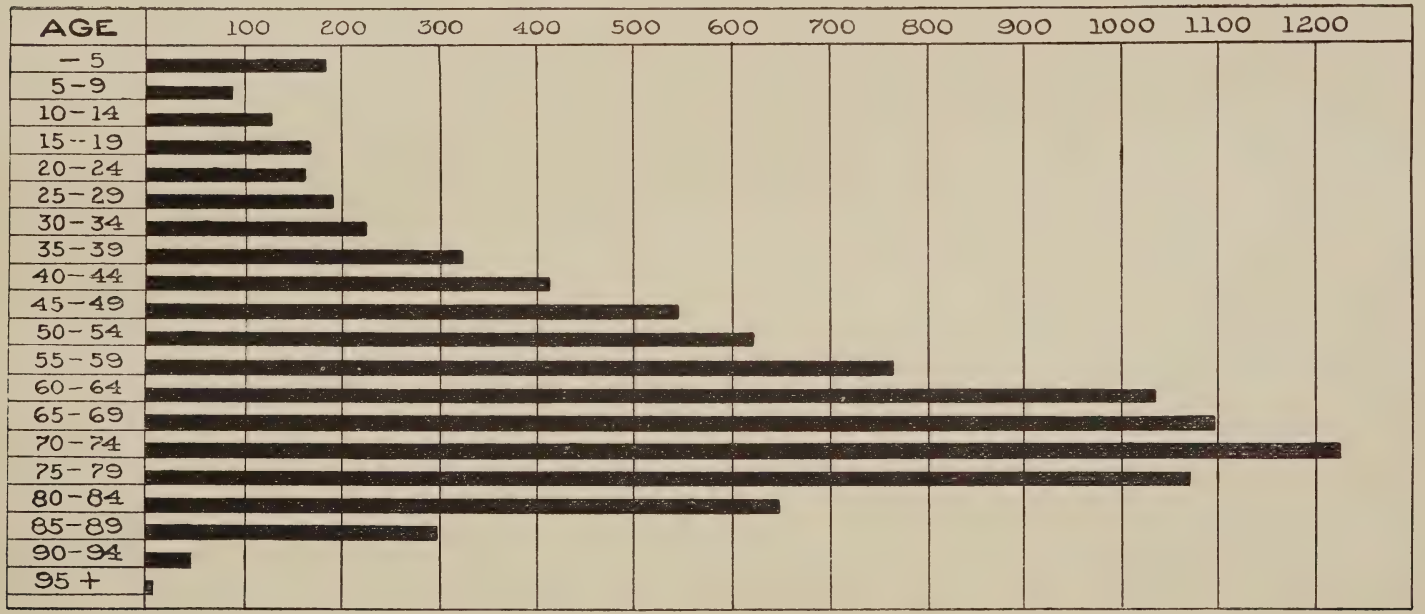


Diagram showing the comparative mortality from Heart Disease by the number of decedents at each age period.

DISEASES OF THE RESPIRATORY SYSTEM.

Diseases of the respiratory system were responsible for 14,384 deaths in 1906, an increase of 544 over the previous year. The rate per 100,000 of population increased from 199.5 to 204.5.

The most important single cause of death in this group was pneumonia, which caused 7,849 deaths. The death rate per 100,000 of population was 11.6, an increase of 704 in the total number of deaths and of 4.7 in the rate. But 36.7 per cent. of the deaths from pneumonia occurred under 5 years of age as compared with 39.8 per cent. during 1906.

The average death rates from pneumonia in the registration area show a slight tendency to decrease for a period 1901 to 1906, inclusive, but the individual rates for the states composing the area show wide variations.

RATE PER 100,000 OF POPULATION, YEAR 1906.

Average rate,	109.5
California,	106.9
Colorado,	147.7
Connecticut,	113.1
Indiana,	76.8
Maine,	106.4
Maryland,	95.6
Massachusetts,	121.6
Michigan,	74.4
New Hampshire,	104.2
New Jersey,	132.3
New York,	123.4
Pennsylvania,	106.9
Rhode Island,	141.5
South Dakota,	50.9
Vermont,	126.4

Broncho-pneumonia was responsible for 2,915 deaths. Of this number 67.7 per cent. occurred to children under five years of age as compared with 75.6 during 1906.

DISEASES OF THE DIGESTIVE SYSTEM.

Deaths from diseases of the digestive system numbered 16,037, a decrease of 1,226 as compared with 1906. The rate per 100,000 of population decreased from 249.1 to 228.0.

Diarrhoea and enteritis were responsible for 9,973 deaths, or 62.1 per cent. of the total.

Cholera infantum (diarrhoea and enteritis under two years of age) caused 8,622 deaths, a reduction of 1,174 as compared with the previous year.

The reduction in this single cause of infantile mortality was almost wholly responsible for the decrease in the number of deaths for this group of diseases.

DISEASES OF THE GENITO-URINARY SYSTEM.

Deaths from diseases of the genito-urinary system numbered 7,659, an increase of 440 as compared with the previous year. The death rate per 100,000 of population increased from 104.2 to 108.9.

Bright's disease supplied the greatest number of deaths from any single cause under this group, 5,761 or 75.2 per cent. being due to this affection.

The distinction between acute nephritis and Bright's disease is not as well defined by physicians as it should be on death certificates; therefore, for practical purposes of comparison, deaths from these two causes may well be considered together.

The returns from the registration area indicate that deaths from these causes are increasing slowly from year to year. The annual average rate for the year 1901 to 1905, inclusive, was 96.0, the rate for 1906 was 98.2, the rate for Pennsylvania for the latter year being 86.9.

VIOLENCE.

Deaths from violence numbered 10,866, an increase of 686 over the previous year. The death rate per 100,000 of population was 154.5 as compared with 146.9 for 1906.

Deaths were distributed among the principal causes of violence as follows:—

	1906.	1907.
Suicide,	780	892
Fractures,	537	166
Burns and scalds,	847	971
Drowning,	555	566
Accidental gunshot wounds,	149	139
Mining injuries,	983	1,508
Steam railway injuries,	2,159	2,134
Homicide,	365	406

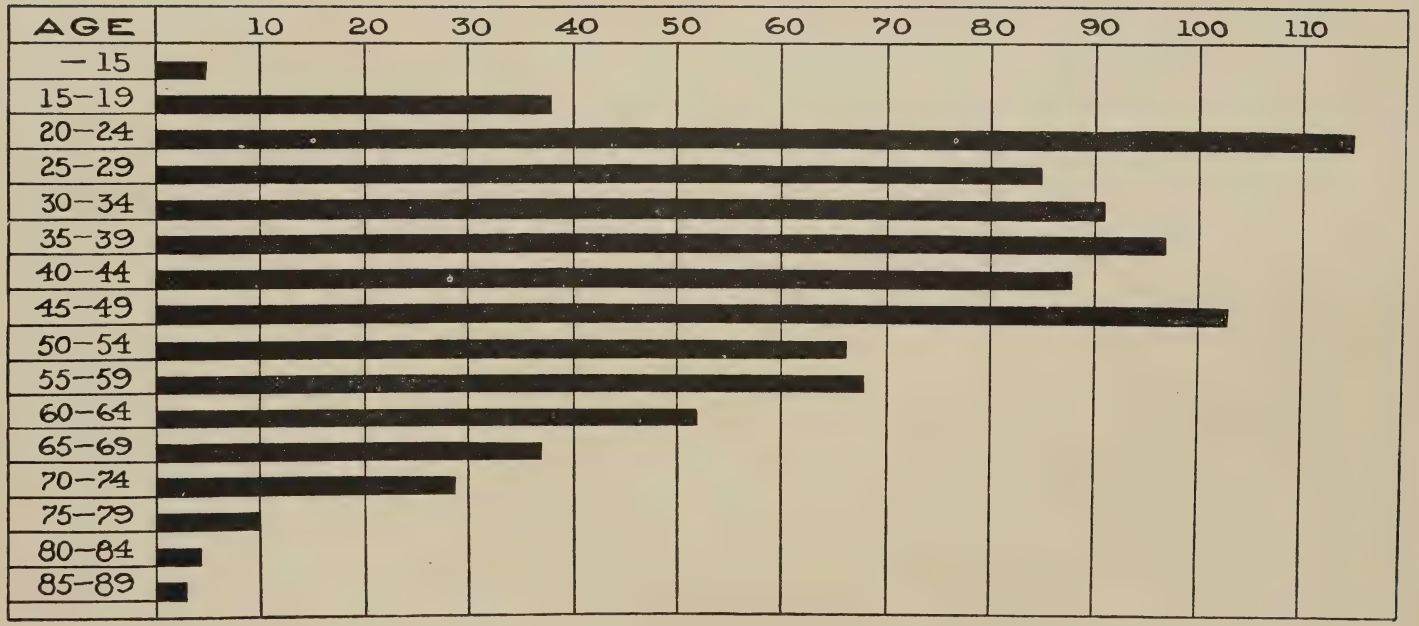


Diagram showing the comparative mortality from Suicide by the number of decedents at each age period.

Of the total suicides, 674 were males and 281 were females. Among the various agencies employed in suicide were firearms 275, poison 251, hanging, 160.

Five suicides were less than 15 years of age.

The rate per 100,000 of population was 12.6 as compared with 11.2 for 1906.

Although fatal railway injuries decreased sightly in numbers, they continued to contribute most extensively to violent deaths.

GENERAL TABLES.

Table 1 gives the deaths by sex and months for the entire State, for incorporated municipalities having over 5,000 population, for the group of municipalities having less than 5,000 population and for the rural sections of each county.

Table 2 gives the deaths in the entire State from each cause and class of causes by sex and age periods.

Table 3 gives the deaths by age periods for the entire State, for all municipalities having more than 8,000 population, for certain municipalities by color, and for each county of the State, including townships and municipalities having less than 8,000 population.

Table 4 gives the deaths from certain specified causes and classes of causes for each municipality in the State having more than 5,000 population and for the rural section of each county.

Table 5 gives the deaths from each specified cause for the entire State and for certain cities.

Table 6 gives the deaths in the entire State by age, sex, color, general nativity and parent nativity.

Table 7 gives the death by color, general nativity and parent nativity for each municipality having more than 8,000 population and for the rural sections of each county, including municipalities having less than 8,000 population.

TABLE 1.

Deaths by sex and months for municipalities having over 5,000 population, for groups of municipalities having less than 5,000 population and for the rural sections of each county, (still births excluded).

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Un.
Entire State,	M.,	115,969	11,024	10,270	10,914	9,754	9,036	8,320	9,496	10,444	9,410	8,797	8,459	10,044	1
	To.,	63,891	5,985	5,560	5,981	5,426	5,026	4,675	5,219	5,735	5,160	4,812	4,712	5,597	1
	F.,	52,078	6,039	4,710	4,833	4,328	4,010	3,645	4,277	4,709	4,250	3,985	3,747	4,447	0
	To.,	65,694	6,250	5,796	6,183	5,644	5,264	4,796	5,697	5,681	5,019	4,856	4,766	5,734	1
Total, cities and boroughs over 5,000 population.	M.,	35,994	3,415	3,163	3,363	3,126	2,926	2,686	3,102	3,110	2,752	2,622	2,630	3,106	1
	F.,	29,700	2,835	2,633	2,820	2,518	2,338	2,110	2,595	2,571	2,267	2,234	2,136	2,628	0
	To.,	2,552	222	228	240	181	187	169	217	217	206	194	204	287	.....
Allegheny,	M.,	1,406	122	118	137	103	107	94	121	120	118	96	113	157	.....
	F.,	1,146	100	110	103	78	80	75	96	97	88	98	91	130	.....
	To.,	761	55	69	61	63	62	58	74	81	78	65	46	49	.....
Allentown,	M.,	427	23	39	34	42	37	32	38	40	43	40	29	30	.....
	F.,	334	32	30	27	21	25	26	36	41	35	25	17	19	.....
	To.,	688	67	62	62	52	47	46	59	69	42	70	59	53	.....
Altoona,	M.,	392	40	31	38	29	24	26	35	36	23	48	34	28	.....
	F.,	296	27	31	24	23	23	20	24	33	19	22	25	25	.....
	To.,	114	6	9	4	12	10	7	16	13	11	12	10	4	.....
Archbald,	M.,	67	3	5	1	5	7	5	9	8	6	7	8	3	.....
	F.,	47	3	4	3	7	3	2	7	5	5	5	2	1	.....
	To.,	94	7	4	9	11	9	9	5	7	12	3	9	9	.....
Ashland,	M.,	48	5	3	5	4	5	4	1	4	7	2	4	4	.....
	F.,	46	2	1	4	7	4	5	4	3	5	1	5	5	.....
	To.,	58	7	7	2	6	1	4	8	2	6	3	5	7	.....
Bangor,	M.,	28	2	5	1	5	0	1	1	1	6	3	1	2	.....
	F.,	30	5	2	1	1	1	3	7	1	0	0	4	5	.....
	To.,	153	15	19	11	9	19	7	10	12	14	9	10	18	.....
Beaver Falls,	M.,	87	8	12	5	5	10	6	5	8	8	4	5	11	.....
	F.,	66	7	7	6	4	9	1	5	4	6	5	5	7	.....
	To.,	162	19	13	10	9	12	14	18	20	13	11	10	13	.....
Bethlehem,	M.,	86	9	10	4	3	8	10	6	10	7	7	7	5	.....
	F.,	76	10	3	6	6	4	4	12	10	6	4	3	8	.....

Bloomsburg,	To.,	103	11	10	11	8	9	8	7	6	6	8	11	8	.....
	M.,	44	5	4	3	5	6	5	2	2	3	4	4	1	.....
	F.,	59	6	6	8	3	3	3	5	4	3	4	7	7	.....
Braddock,	To.,	468	31	28	33	43	31	47	54	53	36	47	36	29	.....
	M.,	286	21	13	23	20	22	29	33	37	22	21	24	21	.....
	F.,	182	10	15	10	23	9	18	21	16	14	26	12	8	.....
Bradford,	To.,	184	18	15	16	13	21	13	17	11	17	12	13	18	.....
	M.,	97	12	8	7	6	11	8	10	4	10	5	7	9	.....
	F.,	87	6	7	9	7	10	5	7	7	7	7	6	9	.....
Bristol,	To.,	124	11	14	8	8	11	7	15	17	10	7	7	9	.....
	M.,	71	4	7	5	7	6	4	7	11	5	5	5	5	.....
	F.,	53	7	7	3	1	5	3	8	6	5	2	2	4	.....
Butler,	To.,	285	31	22	30	16	21	13	17	31	33	44	12	15	.....
	M.,	163	14	14	13	7	14	8	9	17	22	30	6	9	.....
	F.,	122	17	8	17	9	7	5	8	14	11	14	6	6	.....
Carbondale,	To.,	266	26	20	19	22	22	17	23	27	25	18	18	29	.....
	M.,	143	15	12	10	15	12	13	4	18	13	10	8	16	.....
	F.,	120	11	8	9	7	10	4	19	9	12	8	10	13	.....
Carlisle,	To.,	172	18	19	18	11	11	6	13	18	19	16	17	6	.....
	M.,	68	9	6	5	3	4	3	8	3	10	8	7	2	.....
	F.,	104	9	13	13	8	7	3	5	15	9	8	10	4	.....
Carnegie,	To.,	132	11	8	9	6	9	11	21	18	11	9	9	10	.....
	M.,	70	8	3	5	3	7	4	12	12	4	4	5	3	.....
	F.,	62	3	5	4	3	2	7	9	6	7	5	4	7	.....
Chambersburg,	To.,	143	16	11	12	11	17	7	5	14	7	13	11	19	.....
	M.,	82	11	6	8	4	9	4	2	8	3	5	8	14	.....
	F.,	61	5	5	4	7	8	3	3	6	4	8	3	5	.....
Charleroi,	To.,	94	8	13	12	8	8	4	10	8	4	6	9	4	.....
	M.,	62	6	6	8	6	5	2	5	6	3	5	8	2	.....
	F.,	32	2	7	4	2	3	2	5	2	1	1	1	2	.....
Chester,	To.,	587	59	50	65	85	32	52	54	46	50	43	30	43	.....
	M.,	309	25	33	32	31	19	30	26	22	27	30	16	18	.....
	F.,	278	34	17	33	27	13	22	28	24	23	13	14	25	.....
Clearfield,	To.,	109	15	8	12	7	6	9	8	8	7	12	10	7	.....
	M.,	55	5	4	7	5	4	5	7	2	2	7	4	3	.....
	F.,	54	10	4	5	2	2	4	1	6	5	5	6	4	.....
Coatesville,	To.,	176	14	13	18	10	13	15	18	14	22	13	13	13	.....
	M.,	94	6	5	10	7	10	9	11	10	10	6	3	7	.....
	F.,	82	8	8	8	3	3	6	7	4	12	7	10	6	.....

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Un.
Columbia,	To.,	161	18	20	8	16	16	23	13	11	9	10	6	11	.....
	M.,	86	7	9	6	12	8	13	6	6	5	4	3	7	.....
	F.,	75	11	11	2	4	8	10	7	5	4	6	3	4	.....
Connellsville,	To.,	159	13	15	11	11	15	18	9	21	6	17	8	15	.....
	M.,	101	11	10	7	6	11	8	6	12	5	12	4	9	.....
	F.,	58	2	5	4	5	4	10	3	9	1	5	4	6	.....
Conshohocken,	To.,	104	10	13	9	14	1	8	4	13	9	6	6	11	.....
	M.,	52	4	8	3	7	1	3	2	7	4	4	4	5	.....
	F.,	52	6	5	6	7	0	5	2	6	5	2	2	6	.....
Corry,	To.,	86	3	12	11	3	9	3	8	11	7	9	3	7	.....
	M.,	48	3	7	7	1	4	3	3	9	3	0	3	5	.....
	F.,	38	0	5	4	2	5	0	5	2	4	9	0	2	.....
Danville,	To.,	140	12	11	7	12	10	14	9	11	11	15	10	18	.....
	M.,	63	6	8	3	7	2	6	4	4	4	7	5	7	.....
	F.,	77	6	3	4	5	8	8	5	7	7	8	5	11	.....
Dickson City,	To.,	123	11	12	14	7	7	12	9	19	9	9	9	5	.....
	M.,	79	6	8	7	6	5	8	4	12	4	7	7	5	.....
	F.,	44	5	4	7	1	2	4	5	7	5	2	2	0	.....
DuBois,	To.,	152	15	11	18	20	9	12	8	15	8	9	12	15	.....
	M.,	87	7	7	10	12	9	6	5	6	4	6	6	9	.....
	F.,	65	8	4	8	8	0	6	3	9	4	3	6	6	.....
Dunmore,	To.,	218	17	33	13	15	15	24	19	23	18	18	12	11	.....
	M.,	133	12	20	8	8	9	17	12	16	7	7	8	9	.....
	F.,	85	5	13	5	7	6	7	7	7	11	11	4	2	.....
Duquesne,	To.,	231	19	18	19	13	19	13	32	28	21	15	16	18	.....
	M.,	140	11	10	9	9	13	10	16	20	16	9	11	6	.....
	F.,	91	8	8	10	4	6	3	16	8	5	6	5	12	.....
Easton,	To.,	474	52	35	50	29	34	48	28	49	41	37	34	37	.....
	M.,	258	23	18	32	19	21	28	16	24	17	25	21	14	.....
	F.,	216	29	17	18	10	13	20	12	25	24	12	13	23	.....
Edwardsville,	To.,	141	16	7	14	2	8	7	21	22	12	16	10	6	.....
	M.,	76	14	4	8	2	4	3	7	9	6	9	7	3	.....
	F.,	65	2	3	6	0	4	4	14	13	6	7	3	3	.....

Erie,	To.,	979	103	102	81	72	97	79	65	76	67	68	90	79
	M.,	568	60	58	37	41	57	50	39	42	44	39	57	44
	F.,	411	43	44	44	31	40	29	26	34	23	29	33	35
Etna,	To.,	91	5	8	9	11	5	3	8	14	5	10	8	7
	M.,	57	1	5	8	8	1	0	7	10	4	7	2	4
	F.,	34	4	3	1	3	4	3	1	4	1	3	6	3
Forest City,	To.,	94	13	11	9	7	5	2	5	9	13	5	5	10
	M.,	64	8	6	6	4	4	2	5	4	10	2	5	8
	F.,	30	5	5	3	3	1	0	0	5	3	3	0	2
Franklin,	To.,	106	3	11	6	9	11	8	3	14	19	8	4	10
	M.,	55	1	6	2	6	6	4	1	6	12	5	2	4
	F.,	51	2	5	4	3	5	4	2	8	7	3	2	6
Freeland,	To.,	71	10	7	9	2	7	0	6	7	7	8	3	5
	M.,	35	3	7	5	0	5	0	3	1	5	4	1	1
	F.,	36	7	0	4	2	2	0	3	6	2	4	2	4
Greensburg,	To.,	229	20	19	19	11	16	15	17	16	21	27	25	23
	M.,	158	16	13	11	8	13	11	13	7	15	18	20	13
	F.,	71	4	6	8	3	3	14	4	9	6	9	5	10
Greenville,	To.,	84	10	12	11	5	5	1	9	8	6	4	7	6
	M.,	49	6	8	7	2	1	0	6	3	3	4	5	4
	F.,	35	4	4	4	3	4	1	3	5	3	0	2	2
Hanover,	To.,	88	8	5	8	6	6	6	4	9	10	11	10	5
	M.,	39	1	1	3	4	4	1	2	6	4	6	4	3
	F.,	49	7	4	5	2	2	5	2	3	6	5	6	2
Harrisburg,	To.,	869	83	69	70	80	60	79	71	73	67	69	63	85
	M.,	482	53	45	40	44	27	44	39	35	34	41	36	44
	F.,	387	30	24	30	36	33	35	32	38	33	28	27	41
Hazleton,	To.,	194	27	12	19	16	16	15	10	18	17	15	17	12
	M.,	98	11	5	13	7	8	7	7	10	12	4	8	6
	F.,	96	16	7	6	9	8	8	3	8	5	11	9	6
Homestead,	To.,	306	25	25	24	22	15	38	48	22	18	23	24	22
	M.,	182	20	16	13	14	9	23	27	12	11	9	13	14
	F.,	124	5	9	11	8	6	15	21	10	7	14	10	8
Huntingdon,	To.,	92	10	8	8	7	8	5	2	9	13	9	7	6
	M.,	54	7	5	5	5	4	2	1	4	8	7	4	2
	F.,	38	3	3	3	2	4	3	1	5	5	2	3	4
Indiana,	To.,	74	4	10	7	9	6	2	5	9	4	6	6	6
	M.,	37	1	9	2	3	5	0	4	6	1	1	2	3
	F.,	37	3	1	5	6	1	2	1	3	3	5	4	3

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Un.
Jeannette,	To.,	79	5	8	12	8	9	2	8	4	5	3	7	8	.....
	M.,	45	2	7	5	3	7	2	5	2	3	3	4	2	.....
	F.,	34	3	1	7	5	2	0	3	2	2	0	3	6	.....
Johnsonburg,	To.,	48	0	5	5	4	4	1	5	8	5	2	4	5	.....
	M.,	30	0	4	3	2	2	1	3	7	5	0	1	2	.....
	F.,	18	0	1	2	2	2	0	2	1	0	2	3	3	.....
Johnstown,	To.,	715	70	61	46	61	55	58	54	56	85	63	44	62	.....
	M.,	474	44	36	32	36	34	40	41	39	56	46	31	33	.....
	F.,	241	26	25	14	25	21	18	13	17	29	17	13	23	.....
Kane,	To.,	93	12	8	10	4	7	3	6	4	10	10	7	12	.....
	M.,	50	8	4	8	2	4	2	3	1	6	3	4	5	.....
	F.,	43		4	2	2	3	1	3	3	4	7	3	7	.....
Lancaster,	To.,	612	47	54	65	67	49	43	33	67	48	54	48	37	.....
	M.,	309	22	22	33	40	27	24	15	36	26	33	15	16	.....
	F.,	303	25	32	32	27	22	19	18	31	22	21	33	21	.....
Lansford,	To.,	105	8	3	12	8	8	11	5	14	11	8	7	10	.....
	M.,	59	6	2	6	4	6	6	2	10	5	4	3	5	.....
	F.,	46	2	1	6	4	2	5	3	4	6	4	4	5	.....
Latrobe,	To.,	130	18	12	6	11	10	7	11	14	12	7	10	12	.....
	M.,	68	10	6	4	7	5	2	5	9	6	3	8	3	.....
	F.,	62	8	6	2	4	5	5	6	5	6	4	2	9	.....
Lebanon,	To.,	277	39	25	16	25	25	17	21	32	15	19	18	25	.....
	M.,	156	22	11	7	14	17	10	13	20	9	10	8	15	.....
	F.,	121	17	14	9	11	8	7	8	12	6	9	10	10	.....
Lehighton,	To.,	54	7	4	4	6	3	6	6	7	3	1	2	5	.....
	M.,	26	2	2	3	3	2	4	2	2	2	1	1	2	.....
	F.,	28	5	2	1	3	1	2	4	5	1	0	1	3	.....
Lewistown,	To.,	114	12	9	6	8	11	11	12	9	11	8	8	9	.....
	M.,	60	7	6	5	2	5	5	8	5	8	6	2	1	.....
	F.,	54	5	3	1	6	6	6	4	4	3	2	6	8	.....
Lock Haven,	To.,	123	13	13	7	9	14	5	8	9	12	12	12	9	.....
	M.,	68	4	7	4	4	9	2	5	5	7	10	6	5	.....
	F.,	55	9	6	3	5	4	3	3	4	5	2	6	4	.....

McKeesport,	To.,	884	61	67	81	76	60	59	91	83	69	67	80	90
	M.,	516	31	33	56	43	34	42	47	51	34	35	44	66
	F.,	368	30	34	25	33	26	17	44	32	35	32	36	24
McKees Rocks,	To.,	226	18	20	19	12	16	21	27	29	11	16	13	23
	M.,	147	13	10	16	8	6	16	18	17	6	12	11	14
	F.,	79	5	10	3	4	10	5	9	12	5	4	2	10
Mahanoy City,	To.,	235	23	17	20	29	17	17	28	18	18	18	15	15
	M.,	134	13	11	11	15	8	12	14	9	13	11	10	7
	F.,	101	10	6	9	14	9	5	14	9	5	7	5	8
Meadville,	To.,	216	22	22	16	27	17	12	12	11	21	22	16	18
	M.,	112	14	12	8	13	9	3	9	7	11	9	11	6
	F.,	104	8	10	8	14	8	9	3	4	10	13	5	12
Middletown,	To.,	87	7	9	7	5	11	12	5	13	4	6	5	3
	M.,	41	4	5	3	3	6	5	3	5	2	2	2	1
	F.,	46	3	4	4	2	5	7	2	8	2	4	3	2
Millvale,	To.,	103	7	5	12	6	10	11	9	2	10	9	8	14
	M.,	55	2	3	6	5	3	7	5	0	7	5	5	7
	F.,	48	5	2	6	1	7	4	4	2	3	4	3	7
Milton,	To.,	84	5	6	10	8	7	7	0	6	13	5	8	9
	M.,	39	1	5	4	3	6	2	0	2	4	3	5	4
	F.,	45	4	1	6	5	1	5	0	4	9	2	3	5
Minersville,	To.,	102	10	6	12	11	3	3	5	12	16	11	8	5
	M.,	57	4	2	7	8	1	1	3	7	11	6	5	2
	F.,	45	6	4	5	3	2	2	2	5	5	5	3	3
Monongahela,	To.,	108	13	12	9	7	7	8	8	11	4	9	4	16
	M.,	62	8	6	6	2	4	5	6	6	3	5	3	8
	F.,	46	5	6	3	5	3	3	2	5	1	4	1	8
Mount Carmel,	To.,	251	21	26	24	25	24	17	21	16	20	26	19	12
	M.,	144	13	14	14	12	17	9	15	8	11	16	11	4
	F.,	107	8	12	10	13	7	8	6	8	9	10	8	8
Mount Pleasant,	To.,	121	12	13	4	10	4	18	5	22	8	7	12	6
	M.,	65	6	8	2	8	3	7	2	12	4	5	6	2
	F.,	56	6	5	2	2	1	11	3	10	4	2	6	4
Nanticoke,	To.,	226	24	17	25	21	18	11	23	29	27	11	13	7
	M.,	131	16	11	12	14	9	8	16	13	16	5	9	2
	F.,	95	8	6	13	7	9	3	7	16	11	6	4	5
New Brighton,	To.,	132	7	7	17	14	17	15	9	8	12	7	10	9
	M.,	70	6	5	9	7	8	12	4	4	5	4	4	2
	F.,	62	1	2	8	7	9	3	5	4	7	3	6	7

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Un.
New Castle,	To.,	563	43	55	54	58	45	38	43	55	50	33	44	45	.....
	M.,	299	23	34	20	31	26	20	26	28	27	15	24	25	.....
	F.,	264	20	21	34	27	19	18	17	27	23	18	20	20	.....
Norristown,	To.,	628	53	68	59	54	46	53	40	43	38	59	62	53	.....
	M.,	284	27	37	25	24	20	21	13	20	14	25	31	27	.....
	F.,	344	26	31	34	30	26	32	27	23	24	34	31	26	.....
North Braddock,	To.,	171	24	13	19	14	9	10	18	15	12	12	10	13	.....
	M.,	116	16	8	12	8	8	7	13	9	9	6	7	11	.....
	F.,	55	8	5	7	6	1	3	5	6	3	6	3	2	.....
Oil City,	To.,	172	16	15	17	13	14	11	14	11	15	17	17	12	.....
	M.,	99	9	10	8	6	8	8	8	9	6	13	8	6	.....
	F.,	73	7	5	9	7	6	3	6	2	9	4	9	6	.....
Old Forge,	To.,	176	14	19	23	8	11	14	9	23	21	10	13	11	.....
	M.,	99	4	13	12	6	8	9	9	17	8	3	7	3	.....
	F.,	77	10	6	11	2	3	5	0	66	13	7	6	8	.....
Olyphant,	To.,	108	13	6	10	5	5	11	11	12	12	6	9	8	.....
	M.,	63	7	4	3	5	2	7	5	6	7	5	7	5	.....
	F.,	45	6	2	7	0	3	4	6	6	5	1	2	3	.....
Philadelphia,	To.,	27,476	2,757	2,530	2,880	2,558	2,266	1,912	2,345	2,138	1,899	1,843	1,851	2,496	.....
	M.,	14,487	1,470	1,328	1,514	1,344	1,191	1,036	1,246	1,124	1,010	938	956	1,330	.....
	F.,	12,989	1,287	1,202	1,366	1,214	1,075	876	1,099	1,014	889	905	895	1,166	.....
Phoenixville,	To.,	196	15	12	12	19	20	15	17	17	21	14	18	16	.....
	M.,	109	9	4	7	13	14	7	8	13	10	8	10	6	.....
	F.,	87	6	8	5	6	6	8	9	4	11	6	8	10	.....
Pittsburg,	To.,	7,378	635	628	633	600	585	581	710	628	530	566	586	696	.....
	M.,	4,255	360	347	370	368	348	331	399	369	286	319	347	411	.....
	F.,	3,123	275	281	263	232	237	250	311	259	244	247	239	285	.....
Pittston,	To.,	267	33	18	19	26	21	19	32	23	17	22	18	19	.....
	M.,	158	20	9	10	18	13	13	16	12	9	18	7	13	.....
	F.,	109	13	9	9	8	8	6	16	11	8	4	11	6	.....

Plymouth,	To.,	249	16	13	18	25	24	15	16	25	15	31	22	29	
	M.,	127	10	8	12	11	12	8	8	17	9	8	8	16	
	F.,	122	6	5	6	14	12	7	8	8	6	23	14	13	
Pottstown,	To.,	249	21	23	20	22	20	6	20	29	29	21	16	22	
	M.,	130	12	14	12	8	8	1	10	13	17	8	11	16	
	F.,	119	9	9	8	14	12	5	10	16	12	13	5	6	
Pottsville,	To.,	364	36	32	25	36	28	34	27	35	25	24	32	30	
	M.,	201	15	22	18	20	16	19	10	18	13	15	18	17	
	F.,	163	21	10	7	16	12	15	17	17	12	9	14	13	
Punxsutawney,	To.,	123	7	5	12	15	7	6	12	12	14	11	12	10	
	M.,	75	4	2	7	11	6	5	8	7	7	7	6	5	
	F.,	48	3	3	5	4	1	1	4	5	7	4	6	5	
Reading,	To.,	1,427	121	125	121	104	99	107	131	145	117	116	116	125	
	M.,	748	63	67	68	59	46	50	70	78	66	70	52	59	
	F.,	679	58	58	53	45	53	57	61	67	51	46	64	66	
Rochester,	To.,	125	8	11	14	7	11	12	11	9	14	14	7	7	
	M.,	92	6	6	9	7	7	10	8	6	11	10	5	7	
	F.,	33	2	5	5	0	4	2	3	3	3	4	2	0	
Saint Clair,	To.,	96	9	10	4	5	7	5	11	14	6	14	10	1	
	M.,	52	4	6	2	2	3	3	6	7	4	7	7	1	
	F.,	44	5	4	2	3	4	2	5	7	2	7	3	0	
Saint Mary's,	To.,	68	4	2	8	1	7	3	6	5	14	6	7	5	
	M.,	43	4	2	2	1	3	2	5	4	8	4	4	4	
	F.,	25	0	0	6	0	4	1	1	1	6	2	3	1	
Sayre,	To.,	125	12	8	16	15	4	8	11	12	10	6	15	8	
	M.,	82	8	7	8	12	2	6	5	7	8	3	11	5	
	F.,	43	4	1	8	3	2	2	6	5	2	3	4	3	
Scottdale,	To.,	69	12	4	5	4	6	3	7	5	9	5	8	1	
	M.,	36	6	2	2	1	2	1	2	4	7	3	5	1	
	F.,	33	6	2	3	3	4	2	5	1	2	2	3	0	
Scranton,	To.,	1,926	245	144	135	140	153	140	197	176	159	148	135	147	
	M.,	1,101	139	83	81	71	94	88	107	97	90	77	87	87	
	F.,	825	106	61	54	69	59	52	90	79	69	71	48	60	
Shamokin,	To.,	249	30	29	26	20	17	21	21	26	14	15	16	14	
	M.,	133	20	11	16	9	9	17	15	8	7	8	7	6	
	F.,	116	10	18	10	11	8	4	6	18	7	7	9	8	
Sharon,	To.,	300	28	36	29	24	22	18	29	32	22	18	17	25	
	M.,	183	19	19	20	18	18	12	17	19	8	8	12	13	
	F.,	117	9	17	9	6	4	6	12	13	14	10	5	12	
Sharpsburg,	To.,	115	9	15	7	14	12	7	8	11	7	7	11	7	
	M.,	68	8	7	5	4	8	5	4	7	4	4	9	3	
	F.,	47	1	8	2	10	4	2	4	4	3	3	2	4	

TABLE 1.— Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Un.
Shenandoah,	To.,	462	34	31	27	37	30	44	81	46	44	36	26	26	.....
	M.,	274	23	18	11	22	15	26	47	32	25	24	16	15	.....
	F.,	188	11	13	16	15	15	18	34	14	19	12	10	11	.....
South Bethlehem, Northampton Co.	To.,	292	28	22	20	24	30	25	17	41	31	19	13	22	.....
	M.,	162	15	16	13	12	18	10	9	21	21	13	9	5	.....
	F.,	130	13	6	7	12	12	15	8	20	10	6	4	17	.....
Steelton,	To.,	264	23	30	28	20	26	20	27	30	14	8	13	25	.....
	M.,	154	15	19	14	14	18	10	16	12	11	3	7	15	.....
	F.,	110	8	11	14	6	8	10	11	18	3	5	6	10	.....
Sugar Notch,	To.,	48	3	2	4	2	2	2	5	11	5	2	6	4	.....
	M.,	26	2	0	2	1	2	0	3	8	1	1	4	2	.....
	F.,	22	1	2	2	1	0	2	2	3	4	1	2	2	.....
Sunbury,	To.,	153	16	12	12	9	18	9	13	15	14	9	11	15	.....
	M.,	79	8	5	8	4	10	3	6	7	10	5	4	9	.....
	F.,	74	8	7	4	5	8	6	7	8	4	4	7	6	.....
Tamaqua,	To.,	112	8	6	15	5	10	14	4	13	9	9	12	7	.....
	M.,	64	5	6	5	3	7	7	2	7	6	5	6	5	.....
	F.,	48	3	0	10	2	3	7	2	6	3	4	6	2	.....
Tarentum,	To.,	106	5	10	9	9	6	8	17	9	11	9	5	8	.....
	M.,	60	4	3	2	5	3	5	9	8	3	5	1	2	.....
	F.,	46	1	2	7	4	3	3	8	1	3	4	4	6	.....
Titusville,	To.,	124	11	12	13	17	7	12	4	8	5	13	11	11	.....
	M.,	68	6	5	5	12	3	6	2	7	2	8	8	4	.....
	F.,	56	5	7	8	5	4	6	2	1	3	5	3	7	.....
Tyrone,	To.,	93	13	7	13	4	7	5	6	8	11	7	6	6	.....
	M.,	43	6	2	5	1	5	1	5	5	6	3	3	1	.....
	F.,	50	7	5	8	3	2	4	1	3	5	4	3	5	.....
Uniontown, Fayette Co.,	To.,	243	21	15	24	32	12	14	23	14	20	19	20	29	.....
	M.,	177	15	12	15	24	11	10	13	9	15	18	17	18	.....
	F.,	66	6	3	9	8	1	4	10	5	5	1	3	11	.....
Warren,	To.,	109	7	10	9	9	6	9	5	6	9	19	10	10	.....
	M.,	57	4	6	4	6	5	5	1	3	6	7	5	5	.....
	F.,	52	3	4	5	3	1	4	4	3	3	12	5	5	.....

Washington,	To.,	229	16	21	29	29	13	22	17	9	22	16	19	16	
	M.,	122	7	14	11	11	6	14	13	3	11	6	15	11	
	F.,	107	9	7	18	18	7	8	4	6	11	10	4	5	
Waynesboro,	To.,	106	10	12	6	6	4	2	8	13	9	11	5	10	
	M.,	47	5	6	4	3	3	1	2	6	3	5	3	6	
	F.,	59	5	6	2	3	1	1	6	7	6	6	2	4	
West Chester,	To.,	248	19	20	19	23	20	21	17	24	22	21	22	20	
	M.,	115	7	9	11	13	6	7	11	13	10	10	11	7	
	F.,	133	12	11	8	10	14	14	6	11	12	11	11	13	
West Pittston,	To.,	84	7	11	12	5	5	4	8	6	5	9	5	7	
	M.,	40	4	4	6	2	3	2	4	2	3	6	3	1	
	F.,	44	3	7	6	3	2	2	4	4	2	3	2	6	
Wilkes-Barre,	To.,	1,049	81	61	80	71	112	93	94	106	93	69	99	90	
	M.,	621	48	34	49	47	72	56	54	61	53	37	54	56	
	F.,	428	33	27	31	24	40	37	40	45	40	32	45	34	
Wilkinsburg,	To.,	230	30	21	22	13	18	19	20	14	12	20	22	19	
	M.,	124	20	13	10	7	8	9	10	11	4	11	13	8	
	F.,	106	10	8	12	6	10	10	10	3	8	9	9	11	
Williamsport,	To.,	568	68	53	46	47	57	41	41	43	48	49	40	35	
	M.,	316	31	35	28	29	31	24	20	25	26	26	24	17	
	F.,	252	37	18	18	18	26	17	21	18	22	23	16	18	
Wilmerding,	To.,	93	7	4	15	22	5	11	15	3	5	7	3	6	
	M.,	55	4	2	10	16	2	7	10	1	3	4	3	3	
	F.,	38	3	2	5	6	3	4	5	2	2	3	0	3	
York,	To.,	645	47	58	53	48	73	39	35	78	63	41	44	66	
	M.,	343	20	30	30	29	36	19	16	44	33	22	24	40	
	F.,	302	27	28	23	19	37	20	19	34	30	19	20	26	
Total cities and boroughs less than 5,000 population.	To.,	15,496	1,448	1,302	1,382	1,265	1,175	1,097	1,280	1,521	1,351	1,239	1,151	1,291	
	M.,	8,404	776	682	724	681	631	622	701	849	718	663	646	706	
	F.,	7,092	672	720	558	584	544	475	579	672	633	576	505	585	
Total, rural,	To.,	34,779	3,326	3,172	3,349	2,845	2,597	2,427	2,519	3,242	3,040	2,702	2,542	3,019	
	M.,	19,493	1,794	1,715	1,894	1,619	1,469	1,367	1,416	1,776	1,690	1,527	1,434	1,785	
	F.,	15,286	1,532	1,457	1,455	1,226	1,128	1,060	1,103	1,466	1,350	1,175	1,108	1,234	
Counties (Rural).															
Adams Co.,	To.,	279	36	30	29	22	21	20	19	21	23	22	19	17	
	M.,	136	16	19	14	8	7	9	10	5	11	12	12	13	
	F.,	143	20	11	15	14	14	11	9	16	12	10	7	4	
Allegheny Co.,	To.,	2,768	208	233	253	221	205	216	253	280	219	229	219	232	
	M.,	1,712	133	152	164	139	126	138	160	160	132	141	122	145	
	F.,	1,056	75	81	89	82	79	78	93	120	87	88	97	87	

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Un.
Armstrong Co.,	To.,	460	37	47	57	43	32	27	22	52	38	47	28	30	.....
	M.,	268	21	28	33	24	16	17	12	31	21	33	19	13	.....
	F.,	192	16	19	24	19	16	10	10	21	17	14	9	17	.....
Beaver Co.,	To.,	324	21	31	35	18	26	21	16	43	36	16	29	32	.....
	M.,	191	9	19	24	11	17	8	9	27	21	9	20	17	.....
	F.,	133	12	12	11	7	9	13	7	16	15	7	9	15	.....
Bedford Co.,	To.,	417	37	42	41	32	43	25	33	30	39	36	28	31	.....
	M.,	228	20	19	21	17	26	16	20	19	18	21	16	15	.....
	F.,	189	17	23	20	15	17	19	13	11	21	15	12	16	.....
Berks Co.,	To.,	997	97	95	101	104	65	72	71	82	71	89	66	84	.....
	M.,	519	55	49	48	53	31	43	47	36	33	49	29	46	.....
	F.,	478	42	46	53	51	34	29	24	46	38	40	37	38	.....
Blair Co.,	To.,	434	41	34	35	54	33	19	32	45	50	29	31	31	.....
	M.,	242	19	15	21	32	19	11	12	31	31	12	23	16	.....
	F.,	192	22	19	14	22	14	8	20	14	19	17	8	15	.....
Bradford Co.,	To.,	506	38	43	74	53	41	41	33	34	34	33	36	46	.....
	M.,	287	18	26	45	35	26	20	16	17	19	18	22	25	.....
	F.,	219	20	17	29	18	15	21	17	17	15	15	14	21	.....
Bucks Co.,	To.,	718	74	53	81	54	63	64	44	72	72	46	38	57	.....
	M.,	401	45	28	51	31	32	35	23	38	41	26	21	30	.....
	F.,	317	29	25	30	23	31	29	21	34	31	20	17	27	.....
Butler Co.,	To.,	501	51	44	44	33	36	37	35	53	41	42	41	44	.....
	M.,	283	31	21	27	18	22	24	24	31	18	25	22	20	.....
	F.,	218	20	23	17	15	14	13	11	22	23	17	19	24	.....
Cambria Co.,	To.,	827	87	73	67	52	35	64	66	98	81	73	60	72	.....
	M.,	486	52	45	43	27	20	38	43	46	49	45	33	46	.....
	F.,	341	35	28	24	25	15	26	23	52	32	28	27	26	.....
Cameron Co.,	To.,	66	5	4	3	5	4	13	2	2	8	5	10	5	.....
	M.,	41	4	1	2	3	4	8	1	2	7	3	3	3	.....
	F.,	25	1	3	1	2	0	5	1	0	1	2	7	2	.....
Carbon Co.,	To.,	332	25	40	30	24	31	26	24	32	29	22	27	22	.....
	M.,	198	12	23	25	14	22	17	13	15	15	10	14	18	.....
	F.,	134	13	17	5	10	9	9	11	17	14	12	13	4	.....

Centre Co.,	To.,	405	54	38	33	29	29	30	29	29	36	34	34	30	.....
	M.,	214	23	20	21	19	16	14	16	17	14	20	17	17	.....
	F.,	191	31	18	12	10	13	16	13	12	22	14	17	13	.....
Chester Co.,	To.,	914	94	75	95	72	73	45	69	80	87	63	85	76	.....
	M.,	488	52	41	53	41	44	27	34	35	40	38	52	31	.....
	F.,	426	42	34	42	31	29	18	35	45	47	25	33	45	.....
Clarion Co.,	To.,	323	23	29	29	25	25	20	22	32	39	29	21	29	.....
	M.,	183	14	13	20	18	13	11	12	17	20	17	11	17	.....
	F.,	140	9	16	9	7	12	9	10	15	19	12	10	12	.....
Clearfield Co.,	To.,	675	68	64	59	68	54	48	37	62	51	61	47	56	.....
	M.,	353	32	33	30	36	32	23	22	31	28	35	19	32	.....
	F.,	322	36	31	29	32	22	25	15	31	23	26	28	24	.....
Clinton Co.,	To.,	186	11	26	15	16	17	10	12	17	25	15	12	10	.....
	M.,	93	5	11	3	8	10	4	10	9	13	7	10	3	.....
	F.,	93	6	15	12	8	7	6	2	8	12	8	2	7	.....
Columbia Co.,	To.,	270	35	26	29	23	18	14	14	17	20	28	30	16	.....
	M.,	144	20	16	19	16	9	5	7	7	9	11	16	9	.....
	F.,	126	15	10	10	7	9	9	7	10	11	17	14	7	.....
Crawford Co.,	To.,	486	49	40	55	46	44	34	32	33	47	38	28	40	.....
	M.,	244	23	19	21	25	22	20	20	18	24	18	17	17	.....
	F.,	242	26	21	34	21	22	14	12	15	23	20	11	23	.....
Cumberland Co.,	To.,	384	37	36	36	38	24	30	26	31	33	28	41	24	.....
	M.,	195	18	17	19	27	9	9	14	22	16	11	18	15	.....
	F.,	189	19	19	17	11	15	21	12	9	17	17	23	9	.....
Dauphin Co.,	To.,	546	57	50	53	49	49	53	39	37	47	42	31	39	.....
	M.,	301	36	25	30	33	25	25	20	24	22	24	17	20	.....
	F.,	245	21	25	23	16	24	28	19	13	25	18	14	19	.....
Delaware Co.,	To.,	507	50	40	54	46	32	44	37	45	38	43	37	41	.....
	M.,	274	26	20	32	29	20	19	19	26	20	26	17	20	.....
	F.,	233	24	20	22	17	12	25	18	19	18	17	20	21	.....
Elk Co.,	To.,	232	18	16	22	23	21	10	29	18	18	15	14	28	.....
	M.,	136	10	11	17	12	9	7	14	9	13	11	8	15	.....
	F.,	96	8	5	5	11	12	3	15	9	5	4	6	13	.....
Erie Co.,	To.,	406	42	52	44	27	32	27	26	39	17	33	32	35	.....
	M.,	201	21	26	16	14	18	13	14	20	9	17	18	15	.....
	F.,	205	21	26	28	13	14	14	12	19	8	16	14	20	.....
Fayette Co.,	To.,	1,607	138	133	118	98	112	102	160	185	150	123	115	173	.....
	M.,	941	80	71	75	51	73	59	81	106	90	74	72	109	.....
	F.,	666	58	62	43	47	39	43	79	79	60	49	43	64	.....

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Un.
Forest Co.,	To.,	74	9	4	14	3	11	9	1	0	10	0	8	5	.....
	T.,	38	6	2	4	2	6	6	0	0	5	0	4	3	.....
	F.,	36	3	2	10	1	5	3	1	0	5	0	4	2	.....
Franklin Co.,	To.,	550	51	33	66	39	45	35	36	44	61	50	39	51	.....
	M.,	294	22	17	41	18	26	17	21	26	33	21	22	30	.....
	F.,	256	29	16	25	21	19	18	15	18	28	29	17	21	.....
Fulton Co.,	To.,	119	10	16	11	12	8	8	13	9	8	11	5	8	.....
	M.,	61	5	7	8	2	8	4	6	6	4	5	3	3	.....
	F.,	58	5	9	3	10	0	4	7	3	4	6	2	5	.....
Greene Co.,	To.,	280	15	28	30	23	17	25	17	32	27	31	19	16	.....
	M.,	138	8	10	10	13	8	15	9	17	12	16	10	10	.....
	F.,	142	7	18	20	10	9	10	8	15	15	15	9	6	.....
Huntingdon Co.,	To.,	248	26	24	26	23	16	27	8	21	22	14	17	24	.....
	M.,	132	14	16	17	13	10	12	3	12	9	7	4	15	.....
	F.,	116	12	8	9	10	6	15	5	9	13	7	13	9	.....
Indiana Co.,	To.,	668	66	55	63	51	52	42	48	80	50	56	50	55	.....
	M.,	370	34	26	33	28	34	17	21	46	32	33	34	32	.....
	F.,	298	32	29	30	23	18	25	27	34	18	23	16	23	.....
Jefferson Co.,	To.,	521	53	48	62	40	51	34	30	43	42	27	42	49	.....
	M.,	283	30	26	34	24	25	22	16	23	23	14	18	28	.....
	F.,	238	23	22	28	16	26	12	14	20	19	13	24	21	.....
Juniata Co.,	To.,	152	19	16	18	15	10	9	10	8	11	9	16	11	.....
	M.,	74	10	6	11	8	5	3	4	4	5	4	9	5	.....
	F.,	78	9	10	7	7	5	6	6	4	6	5	7	6	.....
Lackawanna Co.,	To.,	378	35	32	36	24	27	30	26	39	43	30	25	31	.....
	M.,	227	18	17	21	20	19	18	17	24	27	16	14	16	.....
	F.,	151	17	15	15	4	8	12	9	15	16	14	11	15	.....
Lancaster Co.,	To.,	1,117	105	124	121	107	82	64	61	81	98	96	81	97	.....
	M.,	612	50	68	63	62	51	37	32	43	53	44	48	61	.....
	F.,	505	55	56	58	45	31	27	29	38	45	52	33	36	.....
Lawrence Co.,	To.,	317	21	34	31	29	30	13	29	37	31	20	18	24	.....
	M.,	157	8	15	13	14	19	11	16	19	12	11	9	10	.....
	F.,	160	13	19	18	15	11	2	13	18	19	9	9	14	.....

Lebanon Co.,	To.,	487	52	50	47	51	52	29	29	33	47	29	37	31	.....
	M.,	243	24	25	19	26	29	15	20	19	18	15	16	17	.....
	F.,	244	28	25	28	25	23	14	9	14	29	14	21	14	.....
Lehigh Co.,	To.,	707	71	61	73	49	54	51	40	72	61	62	58	55	.....
	M.,	369	36	28	35	29	33	22	20	38	34	35	30	29	.....
	F.,	338	35	33	38	20	21	29	20	34	27	27	28	26	.....
Luzerne Co.,	To.,	1,568	169	142	139	138	112	131	97	159	138	120	130	103	.....
	M.,	933	93	88	84	83	66	65	55	102	87	75	76	59	.....
	F.,	635	76	54	55	55	46	66	42	57	51	45	44	44	.....
Lycoming Co.,	To.,	394	44	46	34	23	30	29	24	27	36	26	32	43	.....
	M.,	206	23	22	22	14	15	14	15	11	20	13	16	21	.....
	F.,	188	21	24	12	9	15	15	9	16	16	13	16	22	.....
McKean Co.,	To.,	263	28	22	29	23	19	25	17	19	21	28	17	15	.....
	M.,	158	18	16	18	13	10	17	11	11	12	13	12	7	.....
	F.,	105	10	6	11	10	9	8	6	8	9	15	5	8	.....
Mercer Co.,	To.,	400	37	32	45	42	34	27	23	37	29	25	38	31	.....
	M.,	220	22	19	20	23	15	16	15	24	17	14	19	16	.....
	F.,	180	15	13	25	19	19	11	8	13	12	11	19	15	.....
Mifflin Co.,	To.,	297	32	23	30	29	16	16	25	28	29	16	21	32	.....
	M.,	159	13	12	15	18	10	10	10	17	15	10	14	15	.....
	F.,	138	19	11	15	11	6	6	15	11	14	6	7	17	.....
Monroe Co.,	To.,	214	21	16	17	14	15	22	14	17	30	15	13	20	.....
	M.,	116	11	7	8	9	7	14	8	8	18	8	7	11	.....
	F.,	98	10	9	9	5	8	8	6	9	12	7	6	9	.....
Montgomery Co.,	To.,	1,148	128	110	122	83	70	94	88	111	97	85	74	86	.....
	M.,	617	76	54	66	48	28	60	46	53	56	48	41	41	.....
	F.,	531	52	56	56	35	42	34	42	58	41	37	33	45	.....
Montour Co.,	To.,	144	12	15	13	6	14	9	13	14	12	11	16	9	.....
	M.,	89	9	5	7	4	7	5	8	11	6	8	12	7	.....
	F.,	55	3	10	6	2	7	4	5	3	6	3	4	8	.....
Northampton Co.,	To.,	558	69	45	45	55	40	35	20	62	51	52	34	50	.....
	M.,	314	35	22	29	26	27	22	11	31	27	30	19	35	.....
	F.,	244	34	23	16	29	13	13	9	31	24	22	15	15	.....
Northumberland Co.,	To.,	557	55	57	49	45	37	40	43	48	58	40	41	44	.....
	M.,	293	31	29	25	24	18	24	23	24	35	16	20	24	.....
	F.,	264	24	28	24	21	19	16	20	24	23	24	21	20	.....
Perry Co.,	To.,	207	24	21	24	21	19	15	11	17	22	13	10	10	.....
	M.,	107	11	8	10	10	9	11	8	8	13	7	6	6	.....
	F.,	100	13	13	14	11	10	4	3	9	9	6	4	4	.....

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Un.
Pike Co.,	To.,	94	4	7	8	13	12	3	9	12	10	4	3	9	.....
	M.,	48	3	4	4	5	9	3	4	4	5	1	3	3	.....
	F.,	46	1	3	4	8	3	0	5	8	5	3	0	6	.....
Potter Co.,	To.,	200	32	28	22	15	11	9	20	13	20	13	9	8	.....
	M.,	97	12	13	13	7	5	7	3	7	11	9	5	5	.....
	F.,	103	20	15	9	8	6	2	17	6	9	4	4	3	.....
Schuylkill Co.,	To.,	1,133	100	104	97	96	94	74	104	128	90	89	77	80	.....
	M.,	668	59	59	59	59	50	45	67	74	57	48	45	46	.....
	F.,	465	41	45	38	37	44	29	37	54	33	41	32	34	.....
Snyder Co.,	To.,	186	31	15	19	15	12	12	16	7	20	15	14	10	.....
	M.,	90	14	7	10	8	5	7	8	3	10	6	7	5	.....
	F.,	96	17	8	9	7	7	5	8	4	10	9	7	5	.....
Somerset Co.,	To.,	462	37	39	54	37	36	44	33	48	43	36	28	27	.....
	M.,	251	19	20	32	19	19	30	18	26	21	16	15	16	.....
	F.,	211	18	19	22	18	17	14	15	22	22	20	13	11	.....
Sullivan Co.,		127	16	11	14	15	7	8	16	7	7	10	7	9	.....
	M.,	68	7	5	9	8	4	3	11	4	4	7	3	3	.....
	F.,	59	9	6	5	7	3	5	5	3	3	3	4	6	.....
Susquehanna,	To.,	291	24	38	33	29	30	20	20	22	24	15	15	21	.....
	M.,	150	9	20	16	17	15	13	8	14	10	7	10	11	.....
	F.,	141	15	18	17	12	15	7	12	8	14	8	5	10	.....
Tioga Co.,	To.,	420	43	54	46	42	33	25	30	24	32	39	22	30	.....
	M.,	230	18	28	22	22	24	13	22	14	18	22	11	16	.....
	F.,	190	25	26	24	20	9	12	8	10	14	17	11	14	.....
Union Co.,	To.,	161	19	17	15	14	9	11	8	17	8	11	13	19	.....
	M.,	95	15	9	8	6	4	8	3	10	6	6	10	10	.....
	F.,	66	4	8	7	8	5	3	5	7	2	5	3	9	.....
Venango Co.,	To.,	293	17	21	25	24	23	18	14	29	30	27	29	36	.....
	M.,	159	12	12	11	16	14	13	6	12	16	17	14	16	.....
	F.,	134	5	9	14	8	9	5	8	17	14	10	15	20	.....
Warren Co.,	To.,	365	43	37	18	33	39	36	32	20	36	19	27	31	.....
	M.,	211	25	23	12	21	19	18	19	10	18	12	16	18	.....
	F.,	154	18	14	6	12	14	18	13	10	18	7	11	13	.....

| | | |

TABLE 2.

Deaths in Pennsylvania, from each cause and class of causes, by sex and age, 1907. (Still-births excluded.)

Cause of Death.		Age													
		All ages.	Under 1	1	2	3	4	Under 5.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
All causes,		115,969	26,229	5,527	2,280	1,379	1,018	36,433	2,710	1,783	3,249	4,868	4,887	4,717	4,997
Males,		63,891	14,670	2,931	1,188	745	521	20,055	1,408	979	1,828	2,968	2,959	2,769	3,032
Females,		52,078	11,559	2,596	1,092	634	497	16,378	1,302	804	1,421	1,900	1,928	1,948	1,965
I. General diseases,		29,287	2,280	1,430	897	633	512	5,752	1,289	765	1,500	2,219	2,045	1,919	1,891
Males,		14,889	1,212	746	453	338	277	3,026	620	337	700	1,206	1,155	1,035	1,057
Females,		14,398	1,068	684	444	295	235	2,726	669	428	800	1,013	890	884	834
Typhoid fever,	M.	2,152	11	6	7	22	17	63	81	97	279	439	372	240	197
	F.	1,386	6	13	23	20	17	79	74	124	236	224	152	115	94
Malarial fever,	M.	37	.....	4	.....	1	.....	5	1	.....	1	3	1	1	1
	F.	29	.....	.....	.....	.....	.....	.....	1	1	2	2	2	3	1
Small-pox,	M.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
	F.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Measles,	M.	380	112	132	60	18	14	336	28	3	3	5	1	.....	2
	F.	334	94	99	52	30	17	292	23	6	1	3	1	2	1
Scarlet fever,	M.	326	18	51	59	43	43	214	82	16	4	3	2	3	.....
	F.	331	8	49	41	46	36	180	110	22	7	7	3	.....	.....
Whooping cough,	M.	612	373	145	48	24	12	602	6	1	.....	1	.....	.....	.....
	F.	675	358	193	66	28	13	658	14	2	.....	1	.....	.....	.....
Diphtheria,	M.	871	57	143	128	124	107	559	200	57	28	7	5	3	4
	F.	817	48	105	125	87	97	462	244	56	19	14	5	4	2
Croup,	M.	244	34	52	48	33	25	192	44	4	.....	1	.....	.....	.....
	F.	206	31	51	36	23	19	160	41	2	1	.....	1	1	.....
Influenza,	M.	780	64	18	11	7	10	110	11	6	20	19	19	16	17
	F.	917	52	21	8	6	3	90	12	6	13	17	16	21	19
Cholera nostras,	M.	54	10	4	.....	.....	2	16	2	.....	1	.....	.....	.....	3
	F.	56	6	1	2	.....	.....	9	1	3	.....	.....	1	1	1

Dysentery,	M.,	197	58	33	15	7	1	114	3	.....	1	2	1	1	2
	F.,	219	45	19	16	2	1	83	2	2	.....	2	1	.....	1
Erysipelas,	M.,	187	58	5	.....	.....	2	65	.....	.....	5	6	4	12	9
	F.,	163	59	2	2	.....	1	64	2	1	2	1	3	2	8
Other epidemic diseases,	M.,	18	10	1	1	2	1	15	.....	2	1	.....	.....	.....	.....
	F.,	15	7	2	3	1	.....	13	1	.....	.....	.....	.....	.....	.....
Septicemia,	M.,	130	15	4	1	1	.....	21	11	7	4	7	9	8	5
	F.,	86	12	3	1	1	1	18	2	.....	6	6	9	3	7
Tuberculosis of lungs,	M.,	4,896	133	52	22	17	12	236	52	58	256	585	585	565	575
	F.,	4,421	106	44	29	19	11	209	40	116	423	622	590	547	439
Tuberculosis of larynx,	M.,	71	1	.....	.....	.....	.....	1	.....	.....	2	4	10	9	12
	F.,	28	1	.....	.....	.....	.....	1	.....	.....	.....	.....	6	7	3
Tuberculous meningitis,	M.,	287	75	55	30	19	13	192	28	20	8	6	11	5	6
	F.,	238	72	55	18	15	6	166	27	15	7	7	2	2	4
Abdominal tuberculosis,	M.,	223	24	13	8	3	5	53	15	4	15	23	15	17	17
	F.,	228	23	7	4	3	3	40	9	9	18	26	10	23	19
Pott's disease,	M.,	47	1	1	1	2	.....	5	3	4	4	2	4	7	1
	F.,	35	2	.....	1	1	.....	4	4	4	2	6	3	1	2
Tuberculous abscess,	M.,	6	1	.....	.....	.....	1	2	1	1	.....	1	.....	.....	.....
	F.,	4	1	1	.....	.....	.....	2	.....	.....	.....	.....	2	.....	.....
White swelling,	M.,	22	2	1	.....	.....	.....	3	2	1	3	4	1	2	1
	F.,	19	1	1	1	.....	1	4	.....	3	.....	3	.....	2	.....
Tuberculosis of other organs,	M.,	57	3	4	.....	.....	.....	7	1	3	4	6	1	3	4
	F.,	50	6	3	1	2	.....	12	3	1	1	1	4	2	5
General tuberculosis,	M.,	109	1	3	3	.....	3	10	2	7	7	13	20	14	9
	F.,	84	5	1	1	1	1	9	6	4	6	16	8	10	6
Scrofula,	M.,	11	6	2	.....	.....	.....	8	1	.....	.....	.....	.....	.....	.....
	F.,	8	4	.....	1	1	.....	6	2	.....	.....	.....	.....	.....	.....
Venereal diseases,	M.,	198	115	2	2	.....	1	120	7	.....	1	8	10	12	8
	F.,	146	82	4	2	1	1	90	4	1	1	4	7	6	8
Cancer of mouth,	M.,	113	.....	.....	.....	.....	1	1	.....	1	.....	.....	1	2	2
	F.,	31	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	1
Cancer of stomach and liver,	M.,	777	.....	.....	1	1	.....	2	.....	.....	.....	1	8	16	26
	F.,	889	.....	.....	.....	1	.....	1	.....	1	1	3	7	20	27
Cancer of intestines,	M.,	213	.....	1	1	1	.....	3	2	.....	1	5	6	4	8
	F.,	275	.....	.....	.....	.....	.....	.....	.....	1	1	1	7	8	15

TABLE 2.—Continued.

Cause of Death.		Age													
		All ages.	Under 1	1	2	3	4	Under 5.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
Cancer of female genital organs,	F.,	640	.....	.....	.....	.....	.....	.....	.....	1	.....	8	9	24	54
Cancer of breast,	F.,	368	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11	24
Cancer of skin,	M.,	111	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	3	1
	F.,	77	.....	.....	.....	.....	.....	.....	.....	.....	2	2	.....	1	1
Cancer of other or unspecified organs,	M.,	430	1	.....	1	6	1	9	2	4	2	4	10	12	22
	F.,	496	2	2	4	3	3	14	5	3	4	5	5	14	28
Tumor,	M.,	30	4	1	1	.....	.....	6	1	.....	.....	1	.....	2	2
	F.,	56	1	1	.....	.....	.....	2	.....	1	2	.....	2	2	4
Rheumatism,	M.,	296	2	1	.....	4	2	9	30	26	20	11	14	14	9
	F.,	304	7	1	2	2	3	15	26	31	18	11	12	10	16
Diabetes,	M.,	395	1	.....	1	2	2	6	5	6	16	20	20	18	24
	F.,	447	.....	.....	1	1	.....	2	9	8	14	11	9	15	16
Anemia, Leukemia,	M.,	172	14	10	3	.....	1	28	3	5	11	6	3	4	12
	F.,	185	22	4	3	.....	.....	29	7	4	7	6	4	15	9
Alcoholism,	M.,	360	.....	.....	.....	.....	.....	.....	.....	.....	1	7	15	41	70
	F.,	41	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	4	5
Chronic poisonings,	M.,	21	.....	.....	.....	.....	.....	.....	.....	.....	1	2	2	.....	2
	F.,	13	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	1	1	4
Other general diseases,	M.,	55	8	2	1	1	1	13	2	4	1	4	3	1	6
	F.,	81	7	2	1	1	1	12	.....	.....	3	4	3	7	10
II. Diseases of nervous system,		12,227	2,071	440	180	110	78	2,879	239	165	176	178	193	226	268
Males,		6,549	1,199	241	92	58	42	1,632	123	99	109	113	113	136	170
Females,		5,678	872	199	88	52	36	1,247	116	66	67	65	80	80	98
Encephalitis,	M.,	61	25	5	2	2	1	35	1	1	.....	2	2	2	.....
	F.,	46	10	7	5	1	3	26	2	.....	5	.....	.....	3	.....
Meningitis,	M.,	711	215	109	50	39	23	436	65	42	48	30	15	15	9
	F.,	561	172	80	43	32	20	347	70	36	21	15	10	13	7

Locomotor ataxia,	M.,	141	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	11
	F.,	52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2
Other diseases of spinal cord,	M.,	211	15	8	7	6	2	38	7	3	7	2	8	13	6
	F.,	168	8	3	.....	4	4	19	2	2	3	3	4	.....	2
Apoplexy,	M.,	2,745	51	8	4	1	.....	64	6	4	10	8	23	37	44
	F.,	2,637	34	8	7	2	4	55	10	6	5	12	17	24	38
Softening of brain,	M.,	119	.....	.....	1	.....	.....	1	.....	.....	.....	4	.....	3	1
	F.,	94	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1	1
Paralysis,	M.,	682	5	2	2	1	.....	10	3	1	3	3	13	7	19
	F.,	739	4	3	2	1	.....	10	1	.....	.....	4	3	9	9
General paralysis of insane,	M.,	193	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	6	12	20
	F.,	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2	3
Other forms of mental disease,	M.,	142	.....	.....	.....	.....	.....	.....	.....	1	4	4	6	12	15
	F.,	132	.....	.....	.....	.....	.....	.....	.....	1	1	3	10	7	3
Other diseases of brain,	M.,	153	25	5	4	.....	2	36	7	8	5	11	7	7	12
	F.,	121	14	4	4	1	.....	23	6	6	5	10	6	8	7
Epilepsy,	M.,	177	10	.....	.....	.....	1	11	5	10	10	23	18	16	22
	F.,	133	2	2	1	1	.....	6	4	6	10	7	21	12	14
Convulsions,	M.,	968	816	89	19	7	10	941	9	1	.....	5	2	.....	2
	F.,	737	600	84	19	8	4	715	4	.....	4	3	3	2	.....
Tetanus,	M.,	113	18	1	1	.....	2	22	15	20	8	13	7	7	2
	F.,	46	20	1	.....	.....	1	22	4	6	2	2	.....	3	1
Other diseases of nervous system,	M.,	133	19	14	2	2	1	38	5	8	14	6	4	5	7
	F.,	147	8	7	7	2	.....	24	12	3	11	5	4	6	6
III. Diseases of circulatory system,		11,777	219	26	16	21	24	306	131	154	211	208	240	297	393
Males,		6,310	123	14	10	14	9	170	78	75	109	120	122	151	220
Females,		5,467	96	12	6	7	15	136	53	79	102	88	118	146	173
Pericarditis,	M.,	47	.....	.....	.....	.....	.....	.....	4	1	2	3	1	2	1
	F.,	40	.....	.....	1	.....	1	2	1	2	1	3	1	.....	1
Endocarditis,	M.,	303	6	2	1	1	2	12	11	7	6	4	11	15	11
	F.,	276	8	3	1	2	2	16	11	8	10	12	8	14	8
Heart disease,	M.,	4,894	72	8	8	13	5	106	53	63	90	105	97	115	181
	F.,	4,388	52	9	3	5	11	80	39	68	83	63	95	113	143
Angina pectoris,	M.,	306	2	1	.....	.....	.....	3	1	.....	5	2	5	6	11
	F.,	192	.....	.....	.....	.....	.....	.....	1	.....	.....	2	5	5	8
Diseases of arteries,	M.,	568	.....	.....	.....	.....	.....	.....	2	.....	.....	1	3	5	11
	F.,	378	1	.....	.....	.....	.....	1	.....	.....	1	.....	.....	2	3

TABLE 2.—Continued.

Cause of Death.		Age													
		All ages.	Under 1	1	2	3	4	Under 5.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
Embolism and thrombosis,	M.,	91	2	.....	.....	.....	1	3	1	2	1	2	3	5	3
	F.,	116	1	.....	.....	.....	.....	1	1	.....	2	7	7	7	6
Diseases of veins,	M.,	11	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....
	F.,	22	.....	.....	1	.....	.....	1	.....	1	1	.....	1	1	.....
Diseases of lymphatics,	M.,	5	2	.....	.....	.....	.....	2	.....	.....	1	.....	.....	.....	.....
	F.,	3	2	.....	.....	.....	.....	2	.....	.....	.....	1	.....	.....	.....
Other diseases of circulatory system,	M.,	85	39	3	1	.....	1	44	5	2	4	2	2	3	2
	F.,	52	32	.....	.....	.....	1	33	.....	.....	4	.....	1	4	4
IV. Diseases of respiratory system,		14,384	3,952	1,343	540	237	143	6,215	324	108	229	313	404	397	462
Males,		7,948	2,255	710	292	114	65	3,436	165	41	142	215	260	266	322
Females,		6,436	1,697	633	248	123	78	2,779	159	67	87	98	144	131	140
Laryngitis,	M.,	38	12	5	3	.....	1	21	8	.....	.....	.....	.....	.....	1
	F.,	34	2	6	4	2	4	18	6	1	2	1	2	2	.....
Other diseases of larynx,	M.,	58	15	12	7	6	3	43	8	.....	1	3	1	.....	.....
	F.,	43	7	7	7	5	4	30	7	.....	.....	3	.....	.....	.....
Diseases of thyroid body,	M.,	3	1	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....
	F.,	11	1	.....	.....	.....	.....	1	.....	1	.....	.....	1	3	.....
Acute bronchitis,	M.,	609	366	101	19	13	8	507	8	1	2	.....	5	3	1
	F.,	574	303	79	29	15	6	432	6	1	1	.....	2	1	3
Chronic bronchitis,	M.,	366	22	4	3	2	.....	31	7	1	2	3	7	2	6
	F.,	423	18	10	3	.....	.....	31	4	1	4	2	4	5	6
Bronchopneumonia,	M.,	1,513	678	243	91	32	17	1,061	34	5	8	14	20	27	20
	F.,	1,402	547	233	72	35	27	914	35	8	11	9	13	11	12
Pneumonia (lobar and unqualified),	M.,	4,492	1,054	324	154	55	29	1,616	95	30	111	183	201	201	245
	F.,	3,357	738	282	125	57	34	1,236	92	46	55	76	106	97	103
Pleurisy,	M.,	183	11	6	8	2	5	32	1	1	5	10	12	15	13
	F.,	123	5	6	4	2	.....	17	5	4	4	3	5	4	5

Congestion of lungs,	M.,	250	82	11	6	3	1	103	3	1	4	1	4	5	11
	F.,	245	63	5	3	6	3	80	3	4	4	.....	3	3	1
Gangrene of lungs,	M.,	24	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	2
	F.,	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	3
Asthma and emphysema,	M.,	187	1	2	1	1	.....	5	.....	2	.....	.....	2	6	8
	F.,	128	2	2	.....	.....	.....	4	1	.....	1	.....	3	1	1
Hemorrhage of lungs,	M.,	59	3	.....	.....	.....	.....	3	.....	.....	4	.....	3	2	5
	F.,	87	.....	1	.....	.....	.....	1	.....	.....	2	3	2	3	3
Other diseases of respiratory system,	M.,	166	10	2	.....	.....	1	13	1	.....	4	2	5	3	9
	F.,	52	11	2	1	1	.....	15	.....	1	2	1	3	1	4
V. Diseases of digestive system,		16,037	7,999	1,714	342	130	84	10,269	235	153	207	237	269	319	324
Males,		8,578	4,452	908	179	78	41	5,658	113	90	127	129	131	160	170
Females,		7,459	3,547	806	163	52	43	4,611	122	63	80	108	138	159	154
Diseases of mouth,	M.,	30	19	2	4	1	.....	26	.....	1	.....	.....	.....	.....	.....
	F.,	39	25	7	1	.....	.....	33	1	.....	.....	.....	.....	1	.....
Tonsilitis,	M.,	57	6	6	4	4	2	22	12	3	3	2	2	1	1
	F.,	42	5	2	3	3	3	16	9	3	2	.....	3	4	1
Other diseases of pharynx,	M.,	38	8	1	2	2	2	15	2	.....	1	1	1	.....	.....
	F.,	23	5	1	.....	.....	.....	6	.....	.....	.....	2	2	1	.....
Ulcer of stomach,	M.,	85	.....	1	.....	.....	.....	1	2	1	1	1	2	6	5
	F.,	87	.....	.....	1	.....	.....	1	1	1	7	5	7	6	9
Gastritis,	M.,	389	96	26	10	4	3	139	5	1	2	3	10	10	13
	F.,	445	87	18	7	8	8	128	13	6	2	10	10	14	10
Other diseases of stomach,	M.,	406	220	19	5	3	.....	247	3	1	.....	2	3	7	10
	F.,	341	162	14	1	3	2	182	4	3	4	3	2	2	7
Dentition,	M.,	30	17	11	3	.....	.....	30	.....	.....	.....	.....	.....	.....	.....
	F.,	22	12	10	.....	.....	.....	22	.....	.....	.....	.....	.....	.....	.....
Diarrhea and enteritis,	M.,	5,363	3,909	828	137	49	23	4,946	36	9	11	9	6	13	18
	F.,	4,610	3,144	741	131	23	20	4,059	36	9	10	10	13	22	10
Hernia,	M.,	159	21	1	1	.....	.....	23	.....	1	2	2	7	10	5
	F.,	151	6	.....	.....	1	.....	7	.....	.....	.....	1	.....	2	6
Obstruction of intestines,	M.,	328	81	8	3	3	4	99	8	10	10	13	13	10	18
	F.,	338	38	4	1	7	3	53	8	6	7	13	20	12	17
Other diseases of intestines,	M.,	85	27	3	2	3	.....	35	3	1	2	5	1	2	.....
	F.,	101	26	5	3	1	.....	35	1	1	.....	2	2	8	6

TABLE 2.—Continued.

Cause of Death.		Age													
		All ages.	Under 1	1	2	3	4	Under 5.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
Acute yellow atrophy of liver,	M.	14	1	.....	.....	.....	.....	1	1	.....	.....	1	.....	.....	1
	F.	22	1	.....	1	.....	.....	2	.....	.....	1	1	2	1	4
Hydatid tumors of liver,	M.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	F.	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Cirrhosis of liver,	M.	654	.....	.....	.....	.....	.....	.....	.....	.....	1	9	15	26	44
	F.	308	2	.....	4	.....	.....	6	5	1	3	1	6	13	13
Biliary calculi,	M.	53	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2	2	5
	F.	122	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	3	6	8
Other diseases of liver,	M.	240	17	1	3	2	.....	23	2	6	5	8	5	11	12
	F.	268	11	2	4	2	1	20	3	1	2	2	7	17	10
Diseases of spleen,	M.	9	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2	.....	.....
	F.	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Peritonitis	M.	212	28	.....	6	5	.....	39	7	14	17	14	23	11	11
	F.	287	20	2	5	4	4	35	14	11	13	31	32	32	32
Appendicitis,	M.	413	1	1	.....	2	7	11	32	42	7	56	38	49	26
	F.	239	3	.....	1	.....	2	6	26	20	27	25	29	18	19
Other diseases of digestive system,	M.	12	1	.....	.....	.....	.....	1	.....	.....	.....	2	1	2	1
	F.	10	.....	.....	.....	.....	.....	.....	1	1	1	.....	.....	.....	2
VI. Diseases of genito-urinary system,		7,659	119	40	41	42	28	270	75	67	112	195	251	319	394
Males,		4,198	72	26	27	28	15	168	36	27	45	80	101	126	179
Females,		3,461	47	14	14	14	13	102	39	40	67	115	150	193	215
Acute nephritis,	M.	399	29	16	16	16	12	89	18	3	10	20	16	13	23
	F.	311	18	7	10	5	6	46	20	8	13	17	21	24	25
Bright's disease,	M.	3,202	26	8	8	10	3	55	17	19	31	57	74	107	143
	F.	2,559	16	6	4	7	6	39	18	29	35	50	72	101	130
Other diseases of kidneys,	M.	126	13	2	.....	2	.....	17	.....	4	4	1	5	2	8
	F.	88	11	.....	.....	2	1	14	.....	.....	2	3	4	8	7

Calculi of urinary tract,	M.	24								1		1	2	1	
	F.	12										1		2	1
Diseases of bladder,	M.	202			3			3	1			1	2	1	2
	F.	43	1	1				2	1				2	1	1
Uterine tumor,	F.	123									1	1	2	9	13
Other diseases of uterus,	F.	109								2	6	12	11	17	9
Ovarian tumor,	F.	61									1	2	4	4	5
Diseases of tubes,	F.	128									8	26	31	23	20
Other diseases of genito-urinary system,	M.	245	4					4					2	2	3
	F.	27	1					1		1	1	3	3	4	4
VII. Childbirth,		1,312								1	109	284	291	267	247
Puerperal septicemia,	F.	519									47	120	124	109	84
Puerperal convulsions,	F.	315								1	40	88	60	52	46
Other causes incident to childbirth,	F.	478									22	76	107	106	117
VIII. Diseases of skin,		515	98	15	5	4	4	123	4	1	5	8	5	1	12
Males,		282	54	11	2		3	70	2	1	2	3	3	1	11
Females,		233	41	4	3	4	1	53	2		3	5	2		1
Gangrene,	M.	152	4	2	2			8	1	1				1	4
	F.	137	1	1	1	2		5	1		1	2	2		
Carbuncle,	M.	28	2	1				3			2				2
	F.	12	1	1				2				1			
Abscess,	M.	57	19	6			3	28	1			3	3		5
	F.	41	18	2	1	2	1	24			2	2			
Other diseases of skin,	M.	45	29	2				31							
	F.	43	21		1			22	1						1
IX. Diseases of locomotor system,		185	44	20	10	4	4	82	14	12	12	6	8	5	4
Males,		116	28	12	2	3	1	46	12	8	4	3	6	4	2
Females,		69	16	8	8	1	3	36	2	4	8	3	2	1	2
Diseases of bones,	M.	104	27	11	2	3	1	44	10	7	2	3	6	4	1
	F.	61	16	8	8	1	3	36	2	2	8	3	2	1	1
Diseases of joints,	M.	8		1				1	2	1	1				1
	F.	8								2					1
Other diseases of locomotor system,	M.	4	1					1			1				
	F.														
X. Malformations,		1,496	1,407	45	16	5	6	1,479	9	3	2	3			
Males,		868	819	21	8	4	4	856	5	2	2	3			
Females,		628	588	24	8	1	2	623	4	1					

TABLE 2.—Continued.

Cause of Death.		Age													
		All ages.	Under 1	1	2	3	4	Under 5.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
Hydrocephalus,	M.,	57	40	7	2	1	2	52	3	1	1	.....	.....	.....	.....
	F.,	47	30	10	2	1	1	44	3	.....	.....	.....	.....	.....	.....
Congenital malformation of heart (cyanosis),	M.,	603	578	11	4	1	2	596	2	1	1	3	.....	.....	.....
	F.,	426	411	7	6	.....	1	425	.....	1	.....	.....	.....	.....	.....
Other congenital malformation,	M.,	208	201	3	2	2	.....	208	.....	.....	.....	.....	.....	.....	.....
	F.,	155	147	7	.....	.....	.....	154	1	.....	.....	.....	.....	.....	.....
XI. Diseases of early infancy,		5,604	5,604	.....	.....	.....	.....	5,604	.....	.....	.....	.....	.....	.....	.....
Males,		3,102	3,102	.....	.....	.....	.....	3,102	.....	.....	.....	.....	.....	.....	.....
Females,		2,502	2,502	.....	.....	.....	.....	2,502	.....	.....	.....	.....	.....	.....	.....
Premature birth,	M.,	1,593	1,593	.....	.....	.....	.....	1,593	.....	.....	.....	.....	.....	.....	.....
	F.,	1,299	1,299	.....	.....	.....	.....	1,299	.....	.....	.....	.....	.....	.....	.....
Congenital debility,	M.,	1,509	1,509	.....	.....	.....	.....	1,509	.....	.....	.....	.....	.....	.....	.....
	F.,	1,203	1,203	.....	.....	.....	.....	1,203	.....	.....	.....	.....	.....	.....	.....
XII. Old age,		1,622	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Males,		684	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Females,		938	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
XIII. Violence,		10,866	799	249	192	179	130	1,549	375	345	673	1,198	1,158	940	968
Males,		8,750	465	137	102	101	60	865	245	294	579	1,087	1,058	874	878
Females,		2,116	334	112	90	78	70	684	130	51	94	111	100	66	90
Suicide,	F., M.	674	.....	.....	.....	.....	.....	.....	.....	4	9	82	58	71	71
	F.,	218	.....	.....	.....	.....	.....	.....	.....	1	29	33	27	20	26
Fractures and dislocations,	M.,	69	.....	.....	.....	.....	.....	.....	1	1	4	2	5	4	3
	F.,	97	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Burns and scalds,	M.,	471	16	59	60	63	32	230	19	10	21	39	37	22	23
	F.,	500	10	59	56	52	47	224	60	21	24	17	16	15	25

Heat and sunstroke,	M.	86	40	5	1	.....	.....	46	1	.....	1	2	5	3	8
	F.	54	29	2	1	2	.....	34	.....	.....	1	.....	2	1	3
Cold and freezing,	M.	24	3	.....	.....	.....	.....	3	.....	.....	.....	.....	1	2	2
	F.	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Lightning,	M.	18	.....	.....	.....	.....	1	1	1	3	1	2	2	2	.....
	F.	5	1	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....
Drowning,	M.	518	1	16	4	6	1	28	42	57	53	79	40	44	39
	F.	48	2	7	1	1	.....	11	6	3	3	7	3	2	5
Inhalation of poisonous gases,*	M.	141	5	3	2	5	2	17	4	4	5	10	7	18	10
	F.	62	2	2	1	2	2	9	8	1	3	7	3	2	1
Other accidental poisonings,	M.	163	22	24	8	6	7	67	14	3	2	5	6	3	11
	F.	139	19	19	13	10	5	66	9	4	4	7	11	3	3
Accidental gunshot wounds,	M.	119	.....	.....	1	.....	1	2	15	32	16	19	12	4	5
	F.	20	.....	1	.....	.....	.....	1	6	4	2	.....	1	2	.....
Injuries by machinery,	M.	273	.....	.....	.....	.....	.....	.....	1	11	43	41	36	31	29
	F.	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....
Injuries in mines and quarries,	M.	1,543	.....	.....	.....	.....	.....	.....	.....	23	162	255	301	208	202
	F.	1	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....
Railroad accidents and injuries,	M.	2,025	1	4	.....	3	1	9	36	58	159	329	325	247	238
	F.	109	.....	5	1	1	.....	7	6	6	9	13	11	2	7
Street car accidents,	M.	223	.....	1	3	8	3	15	29	16	6	14	16	24	26
	F.	39	.....	.....	2	2	5	9	10	1	1	3	2	1	.....
Injuries by vehicles and horses,	M.	266	1	1	3	1	3	9	21	13	19	17	13	17	27
	F.	31	1	3	2	.....	3	9	3	1	1	2	.....	3	.....
Automobile accidents,	M.	28	.....	.....	.....	2	.....	2	3	2	2	3	2	3	2
	F.	8	.....	.....	.....	.....	.....	.....	4	.....	.....	1	.....	1	.....
Suffocation	M.	84	41	3	1	.....	.....	45	3	7	1	5	5	6	2
	F.	40	29	2	2	.....	.....	33	.....	.....	1	1	1	.....	1
Other accidental injuries,	M.	1,398	28	20	18	7	9	82	51	49	61	126	125	111	138
	F.	458	31	10	11	6	8	66	4	6	9	5	9	5	10
Injuries at birth,	M.	299	299	.....	.....	.....	.....	299	.....	.....	.....	.....	.....	.....	.....
	F.	203	203	.....	.....	.....	.....	203	.....	.....	.....	.....	.....	.....	.....
Homicide,	M.	328	8	1	1	.....	.....	10	4	1	14	57	62	54	42
	F.	78	7	2	.....	1	.....	10	4	2	7	15	13	8	8
XIV. Ill-defined causes,		2,998	1,640	205	41	14	5	1,905	15	9	13	19	23	27	34

*Includes conflagration.

TABLE 2.—Continued.

Cause of Death.	Age													
	All ages.	Under 1	1	2	3	4	Under 5.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
Males,	1,617	889	105	21	7	4	1,026	9	5	9	9	10	16	25
Females,	1,381	751	100	20	7	1	879	6	4	4	10	13	11	11
"Dropsy," M.	80	.....	1	2	2	.....	5	2	2	1	.....	1	3	3
"Dropsy," F.	92	.....	1	.....	.....	.....	1	.....	.....	1	1	1	3	1
"Heart failure," M.	263	47	4	.....	.....	1	52	2	2	2	6	3	2	10
"Heart failure," F.	174	36	2	.....	1	.....	39	2	2	.....	2	7	6	7
Other ill-defined causes, M.	1,042	688	95	17	5	2	807	3	1	4	2	3	7	2
Other ill-defined causes, F.	945	595	89	20	6	1	711	3	2	3	4	2	2	2
Unknown causes, M.	232	154	5	2	.....	1	162	2	.....	2	1	3	4	8
Unknown causes, F.	170	120	8	.....	.....	.....	128	1	.....	.....	3	3	.....	1

TABLE 2.—Continued.

Cause of Death.	Age											
	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
All causes,	4,669	4,751	4,901	5,263	6,150	6,510	6,731	5,933	4,271	2,199	668	172	107
Males,	2,798	2,808	2,870	2,951	3,420	3,418	3,385	2,899	1,979	968	281	52	64
Females,	1,871	1,943	2,031	2,312	2,730	3,092	3,346	3,034	2,292	1,231	387	120	43
I. General diseases,	1,637	1,619	1,528	1,453	1,477	1,290	1,184	909	494	222	56	14	24

Males,	866	846	799	716	721	581	500	384	208	96	22	5	9
Females,	771	773	729	737	756	709	684	525	286	126	34	9	15
Typhoid fever, M.	116	92	71	43	26	14	13	8	1	.....	.....	.....	.....
Typhoid fever, F.	71	62	42	37	25	26	17	5	2	.....	.....	.....	1
Malarial fever, M.	5	3	3	4	2	4	2	1	.....	.....	.....	.....	.....
Malarial fever, F.	.....	1	4	3	1	1	3	1	3	.....	.....	.....	.....
Small-pox, M.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Small-pox, F.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Measles, M.	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Measles, F.	2	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Scarlet fever, M.	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Scarlet fever, F.	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....
Whooping cough, M.	.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Whooping cough, F.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Diphtheria, M.	4	.....	1	1	1	.....	.....	.....	.....	.....	.....	.....	1
Diphtheria, F.	.....	2	3	1	1	2	1	.....	.....	.....	.....	.....	1
Croup, M.	.....	.....	1	.....	.....	1	1	.....	.....	.....	.....	.....	.....
Croup, F.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Influenza, M.	23	34	43	38	45	71	87	91	72	45	9	2	2
Influenza, F.	22	37	30	45	64	90	128	134	99	50	18	4	2
Cholera nostras, M.	3	1	5	2	4	3	2	3	4	4	1	.....	.....
Cholera nostras, F.	3	2	4	1	1	3	2	10	13	.....	1	.....	.....
Dysentery, M.	2	5	6	1	7	3	14	11	14	3	2	.....	.....
Dysentery, F.	3	1	7	10	15	18	19	27	15	10	3	.....	.....
Erysipelas, M.	12	9	15	5	8	7	12	10	6	2	.....	.....	.....
Erysipelas, F.	6	7	9	7	10	6	9	12	9	4	1	.....	.....
Other epidemic diseases, M.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other epidemic diseases, F.	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Septicemia, M.	9	12	10	4	4	10	4	2	2	1	.....	.....	.....
Septicemia, F.	7	3	4	3	1	3	2	7	4	1	.....	.....	.....
Tuberculosis of lungs, M.	449	398	332	257	228	140	96	53	20	7	1	.....	3
Tuberculosis of lungs, F.	342	254	184	151	155	121	117	80	19	8	.....	.....	4
Tuberculosis of larynx, M.	6	8	5	5	4	.....	2	2	.....	1	.....	.....	.....
Tuberculosis of larynx, F.	2	6	.....	2	.....	.....	.....	1	.....	.....	.....	.....	.....
Tuberculous meningitis, M.	3	3	2	.....	1	1	1	.....	.....	.....	.....	.....	.....
Tuberculous meningitis, F.	4	1	.....	1	.....	.....	1	.....	.....	1	.....	.....	.....

TABLE 2.—Continued.

Cause of Death.		Age												
		40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
Abdominal tuberculosis,	M.,	14	15	3	8	9	4	5	4	1	1	.....	.....	.....
	F.,	13	15	10	13	9	6	4	3	1	.....	.....	.....	.....
Pott's disease,	M.,	2	1	4	.....	4	1	2	2	1	.....	.....	.....	.....
	F.,	4	1	1	1	.....	.....	1	1	.....	.....	.....	.....	.....
Tuberculous abscess,	M.,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	F.,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
White swelling,	M.,	1	.....	.....	1	2	1	.....	.....	.....	.....	.....	.....	.....
	F.,	1	1	1	1	1	1	.....	.....	.....	1	.....	.....	.....
Tuberculosis of other organs,	M.,	7	4	2	6	7	.....	1	1	.....	.....	.....	.....	.....
	F.,	4	6	2	3	2	1	1	1	1	.....	.....	.....	.....
General tuberculosis,	M.,	5	9	3	5	.....	4	.....	1	.....	.....	.....	.....	.....
	F.,	5	3	1	4	1	.....	3	.....	1	.....	.....	.....	1
Scrofula,	M.,	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....
	F.,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Venereal diseases,	M.,	10	9	8	4	2	1	4	.....	.....	.....	.....	.....	.....
	F.,	11	4	3	2	1	2	.....	2	.....	.....	.....	.....	.....
Cancer of mouth,	M.,	6	3	11	17	20	16	17	4	4	2	1	.....	.....
	F.,	.....	1	4	4	3	1	4	5	4	2	.....	.....	.....
Cancer of stomach and liver,	M.,	53	66	84	120	126	96	82	66	20	6	2	1	2
	F.,	50	65	117	126	125	119	122	69	24	9	1	1	1
Cancer of intestines,	M.,	11	15	26	33	35	28	18	13	4	1	.....	.....	.....
	F.,	11	20	28	39	39	39	30	21	12	1	1	1	.....
Cancer of female genital organs,	F.,	81	102	94	71	74	59	27	27	5	2	1	.....	1
Cancer of breast,	F.,	35	45	40	52	36	40	33	28	15	5	1	1	2
Cancer of skin,	M.,	3	3	8	10	16	13	13	14	16	5	3	2	.....
	F.,	.....	1	7	5	4	13	13	6	7	10	3	1	1

Cancer of other or unspecified organs.	M.	23	30	44	40	54	59	38	45	22	8	2	.....	.....
	F.	41	53	57	45	61	54	58	23	15	10	1	.....	.....
Tumor,	M.	.....	1	4	4	1	2	1	2	2	1	.....	.....	.....
	F.	2	6	3	5	9	1	8	6	.....	1	2	.....	.....
Rheumatism,	M.	20	21	17	11	25	20	18	20	7	4	.....	.....	.....
	F.	7	12	18	20	17	20	24	20	18	8	.....	1	.....
Diabetes,	M.	18	18	30	41	46	48	45	23	6	5	.....	.....	.....
	F.	13	32	38	48	77	64	48	28	14	.....	.....	.....	1
Anemia, leukemia,	M.	11	15	12	18	16	8	12	5	2	.....	1	.....	.....
	F.	8	13	9	24	18	12	6	6	4	3	1	.....	.....
Alcoholism,	M.	41	61	39	34	23	19	5	2	1	.....	.....	.....	1
	F.	14	6	3	4	.....	.....	.....	1	.....	.....	.....	.....	.....
Chronic poisonings,	M.	3	3	3	1	.....	1	2	1	.....	.....	.....	.....	.....
	F.	.....	1	.....	2	1	.....	.....	1	.....	.....	.....	.....	.....
Other general diseases,	M.	3	.....	7	3	4	.....	1	.....	3	.....	.....	.....	.....
	F.	9	7	6	7	3	6	3	.....	1	.....	.....	.....	.....
II. Diseases of nervous system,		319	446	558	704	949	1,212	1,278	1,159	760	393	98	24	13
Males,		202	235	309	376	504	649	647	576	341	164	39	6	6
Females,		117	211	249	328	445	563	631	583	419	219	59	18	7
Encephalitis,	M.	3	2	4	5	1	1	2	.....	.....	.....	.....	.....	.....
	F.	.....	1	.....	2	3	2	1	.....	.....	1	.....	.....	.....
Meningitis,	M.	15	6	10	4	4	7	3	2	.....	.....	.....	.....	.....
	F.	9	5	6	9	6	2	2	.....	1	.....	2	.....	.....
Locomotor ataxia,	M.	10	14	24	15	22	24	13	4	2	.....	.....	.....	.....
	F.	5	6	5	8	6	7	9	.....	1	.....	1	.....	.....
Other diseases of spinal cord.	M.	9	10	14	14	14	28	15	14	6	2	.....	1	.....
	F.	4	13	12	10	22	26	24	17	4	1	.....	.....	.....
Apoplexy,	M.	59	115	159	240	340	448	442	384	227	108	26	1	.....
	F.	49	113	157	199	296	376	436	383	269	146	33	10	3
Softening of brain,	M.	5	5	8	11	8	15	15	20	18	5	.....	.....	.....
	F.	2	4	3	9	11	9	11	16	18	8	.....	.....	.....
Paralysis,	M.	21	22	34	34	72	80	117	114	72	42	11	4	.....
	F.	9	19	29	50	57	107	112	135	110	49	19	6	1
General paralysis of insane,	M.	33	34	11	15	16	13	12	10	6	2	.....	.....	1
	F.	1	11	5	8	12	4	4	4	2	4	2	1	1

TABLE 2.—Continued.

Cause of Death.		Age												
		40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
Other forms of mental disease,	M.	10	9	20	7	7	16	12	11	3	1	1	.....	3
	F.	9	17	15	15	18	7	10	4	2	3	1	.....	1
Other diseases of brain,	M.	11	4	12	9	3	3	4	9	2	2	1	.....	.....
	F.	8	9	2	4	5	5	4	8	2	3	.....	.....	.....
Epilepsy,	M.	14	6	9	10	7	5	4	2	3	.....	.....	.....	2
	F.	11	6	9	5	4	7	6	3	2	.....	.....	.....	.....
Convulsions,	M.	1	2	1	2	1	.....	1	.....	.....	.....	.....	.....	.....
	F.	1	1	.....	.....	.....	1	.....	1	2	.....	.....	.....	.....
Tetanus,	M.	6	3	1	3	3	2	.....	1	.....	.....	.....	.....	.....
	F.	1	1	2	1	.....	.....	1	.....	.....	.....	.....	.....	.....
Other diseases of nervous system,	M.	5	3	2	7	6	7	7	5	2	3	.....	.....	.....
	F.	8	5	4	8	5	10	11	12	6	4	1	1	1
III. Diseases of circulatory system,		509	629	767	929	1,287	1,405	1,532	1,337	898	422	98	16	8
Males,		264	330	447	511	735	771	818	705	432	199	43	6	4
Females,		245	299	320	418	552	634	714	632	466	223	55	10	4
Pericarditis,	M.	3	.....	3	6	5	5	3	5	2	1	.....	.....	.....
	F.	.....	3	3	3	4	6	1	7	1	1	.....	.....	.....
Endocarditis,	M.	17	16	26	18	32	26	35	19	26	9	1	1	.....
	F.	12	13	21	22	15	24	29	24	19	9	1	.....	.....
Heart disease,	M.	209	284	356	412	579	589	637	548	304	141	27	3	4
	F.	205	261	269	351	466	508	580	516	340	158	39	7	4
Angina pectoris,	M.	8	10	25	34	53	61	36	31	11	3	1	.....	.....
	F.	13	8	10	15	26	31	34	18	13	.....	3	.....	.....
Diseases of arteries,	M.	11	11	26	24	67	79	92	99	82	42	12	1	.....
	F.	5	3	9	15	30	55	57	53	82	48	12	2	.....
Embolism and thrombosis,	M.	11	6	4	13	8	8	10	2	5	2	1	1	.....
	F.	8	8	6	11	10	7	11	9	8	7	.....	.....	.....

Diseases of veins,	M.,	1	2	.....	2	.....	1	2	.....	.....	.....	1	.....	.....
	F.,	2	2	2	1	1	2	2	3	2	.....	.....	.....	.....
Diseases of lymphatics,	M.,	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	F.,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other diseases of circulatory system,	M.,	4	1	5	2	.....	2	3	1	2	1	.....	.....	.....
	F.,	.....	1	.....	.....	.....	1	.....	2	1	.....	.....	1	.....
IV. Diseases of respiratory system,		459	499	502	621	677	752	807	695	544	263	75	27	11
Males,		314	338	311	367	384	389	370	287	206	104	22	5	4
Females,		145	161	191	254	293	363	437	408	338	159	53	22	7
Laryngitis,	M.,	1	2	1	.....	1	1	1	1	.....	.....	.....	.....	.....
	F.,	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....
Other diseases of larynx,	M.,	1	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	F.,	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Diseases of thyroid body,	M.,	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
	F.,	1	1	.....	1	1	.....	.....	1	.....	.....	.....	.....	.....
Acute bronchitis,	M.,	4	5	5	8	12	12	9	6	9	11	1	.....	.....
	F.,	2	4	2	4	10	20	20	21	25	13	6	1	.....
Chronic bronchitis,	M.,	7	11	17	22	39	39	57	48	45	15	5	1	1
	F.,	8	6	13	29	29	53	71	68	49	24	9	6	1
Bronchopneumonia,	M.,	21	34	24	39	46	34	38	39	25	19	3	1	1
	F.,	13	17	22	38	42	51	50	57	58	28	5	7	1
Pneumonia (lobar and unqualified),	M.,	235	222	195	229	219	236	196	139	83	43	9	2	2
	F.,	107	118	129	157	166	192	231	196	151	68	22	4	5
Pleurisy,	M.,	13	9	11	13	8	9	14	13	3	1	.....	.....	.....
	F.,	4	3	6	8	10	7	14	13	6	3	2	.....	.....
Congestion of lungs,	M.,	3	13	10	10	10	9	13	11	25	10	3	1	.....
	F.,	2	6	5	4	13	13	22	32	28	14	5	3	.....
Gangrene of lungs,	M.,	4	5	.....	4	1	2	1	1	.....	1	.....	.....	.....
	F.,	.....	.....	.....	1	.....	1	1	.....	.....	1	.....	.....	.....
Asthma and emphysema,	M.,	7	10	21	22	22	23	23	21	12	3	.....	.....	.....
	F.,	1	3	10	9	18	17	23	13	14	6	2	1	.....
Hemorrhage of lungs,	M.,	8	5	5	6	8	4	4	2	.....	.....	.....	.....	.....
	F.,	.....	2	3	1	3	6	3	3	1	1	.....	.....	.....
Other diseases of respiratory system,	M.,	10	22	20	14	17	20	14	6	4	1	1	.....	.....
	F.,	4	1	1	2	1	3	2	2	6	1	2	.....	.....

TABLE 2.—Continued.

Cause of Death.		Age												
		40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
V. Diseases of digestive system,		339	339	412	457	494	504	517	454	312	134	43	16	6
Males,		195	191	226	235	262	236	243	196	133	57	18	4	4
Females,		144	148	186	222	232	268	274	258	179	77	25	9	2
Diseases of mouth,	M.,	1	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....
	F.,	.....	1	.....	.....	.....	1	1	.....	1	.....	.....	.....	.....
Tonsilitis,	M.,	3	.....	2	2	1	.....	1	1	1	.....	.....	.....	.....
	F.,	.....	.....	.....	1	.....	2	.....	.....	.....	.....	1	.....	.....
Other diseases of pharynx,	M.,	2	1	1	3	4	4	3	.....	.....	.....	.....	.....	.....
	F.,	.....	.....	.....	3	.....	3	3	1	2	.....	.....	.....	.....
Ulcer of stomach,	M.,	9	8	11	10	5	3	10	7	2	.....	.....	.....	1
	F.,	6	4	6	5	5	9	6	5	1	2	1	.....	.....
Gastritis,	M.,	16	11	10	13	20	30	42	34	22	6	2	.....	.....
	F.,	15	10	13	23	23	30	38	51	32	10	5	2	.....
Other diseases of stomach,	M.,	7	6	18	12	20	14	14	18	9	8	3	3	1
	F.,	5	9	13	9	11	17	25	12	18	13	2	.....	.....
Dentition,	M.,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	F.,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Diarrhea and enteritis,	M.,	14	24	16	31	41	39	41	45	37	18	7	.....	2
	F.,	15	14	28	34	44	56	70	84	55	25	11	4	1
Hernia,	M.,	10	13	6	18	10	11	11	10	12	5	2	1	.....
	F.,	11	10	13	22	20	18	20	13	6	1	.....	.....	1
Obstruction of intestines,	M.,	13	10	16	15	25	18	20	12	12	3	2	.....	.....
	F.,	23	13	20	25	21	27	30	18	16	7	1	1	.....
Other diseases of intestines,	M.,	6	.....	2	5	3	1	5	9	2	2	1	.....	.....
	F.,	6	2	3	4	5	3	8	7	6	1	.....	1	.....
Acute yellow atrophy of liver,	M.,	.....	.....	2	2	1	1	3	1	.....	.....	.....	.....	.....
	F.,	1	.....	.....	.....	3	3	2	1	1	.....	.....	.....	.....

Hydatid tumors of liver,	M.,	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
	F.,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cirrhosis of liver,	M.,	60	62	84	85	86	69	58	31	16	8	.....	.....	.....
	F.,	18	21	38	37	37	32	32	23	13	9	1	.....	.....
Biliary calculi,	M.,	2	4	9	3	6	7	5	4	2	1	.....	.....	.....
	F.,	6	8	13	17	18	22	6	8	3	2	.....	1	.....
Other diseases of liver,	M.,	13	21	22	15	21	23	23	14	10	5	1	.....	.....
	F.,	12	16	20	20	31	31	25	28	18	3	2	.....	.....
Diseases of spleen,	M.,	.....	1	1	2	.....	.....	.....	2	.....	.....	.....	.....	.....
	F.,	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
Peritonitis	M.,	9	10	11	9	13	5	5	7	6	1	.....	.....	.....
	F.,	12	20	13	7	7	11	4	6	5	2	.....	.....	.....
Appendicitis,	M.,	27	20	15	10	4	8	2	.....	2	.....	.....	.....	.....
	F.,	14	18	6	12	6	3	4	1	2	2	1	.....	.....
Other diseases of digestive system,	M.,	3	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....
	F.,	.....	2	.....	1	1	.....	1	.....	.....	.....	.....	.....	.....
VI. Diseases of genito-urinary system,		483	500	563	656	747	852	816	674	441	188	39	12	5
Males,		233	241	305	391	449	489	491	407	291	106	24	5	4
Females,		250	259	258	265	298	363	325	267	150	82	15	7	1
Acute nephritis,	M.,	31	18	29	32	28	21	14	19	8	5	1	.....	1
	F.,	23	17	15	13	24	13	20	4	5	2	.....	.....	1
Bright's disease,	M.,	186	208	257	338	371	387	382	287	196	67	14	4	2
	F.,	148	186	200	231	241	331	284	243	129	74	11	7	.....
Other diseases of kidneys,	M.,	7	5	7	6	8	17	11	12	9	2	1	.....	.....
	F.,	5	8	5	3	6	5	6	3	5	3	1	.....	.....
Calculi of urinary tract,	M.,	1	1	2	2	3	3	1	6	.....	.....	.....	.....	.....
	F.,	1	2	1	1	1	.....	1	.....	1	.....	.....	.....	.....
Diseases of bladder,	M.,	3	4	6	6	16	19	31	41	41	19	5	1	.....
	F.,	3	2	3	2	.....	2	3	8	9	1	3	.....	.....
Uterine tumor,	F.,	26	19	17	7	14	7	3	4	.....	.....	.....	.....	.....
Other diseases of uterus,	F.,	19	12	7	3	5	2	3	1	.....	.....	.....	.....	.....
Ovarian tumor,	F.,	8	9	7	5	5	1	4	4	.....	2	.....	.....	.....
Diseases of tubes,	F.,	14	4	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Other diseases of genito-urinary system,	M.,	5	5	4	7	23	42	52	42	37	13	3	.....	1
	F.,	3	.....	2	.....	1	2	1	.....	1	.....	.....	.....	.....

TABLE 2.—Continued.

Cause of Death.		Age												
		40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
VII. Childbirth,		102	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Puerperal septicemia,	F.,	32	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Puerperal convulsions,	F.,	24	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other causes incident to childbirth,	F.,	46	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
VIII. Diseases of skin,		8	11	18	18	34	48	57	68	46	34	12	2	.....
Males,		8	7	13	10	12	24	27	38	26	15	7	2	.....
Females,		.....	4	5	8	22	24	30	30	20	19	5	.....	.....
Gangrene,	M.,	2	2	6	3	7	18	20	34	24	13	6	2	.....
	F.,	.....	2	2	7	16	15	20	23	18	19	4	.....	.....
Carbuncle,	M.,	2	3	2	4	4	2	2	1	.....	1	.....	.....	.....
	F.,	.....	.....	.....	.....	2	3	1	2	1	.....	.....	.....	.....
Abscess,	M.,	4	1	5	1	1	1	3	.....	.....	1	.....	.....	.....
	F.,	.....	2	1	1	1	3	3	2	.....	.....	.....	.....	.....
Other diseases of skin,	M.,	.....	1	.....	2	.....	3	2	3	2	.....	1	.....	.....
	F.,	.....	.....	2	.....	3	3	6	3	1	.....	1	.....	.....
IX. Diseases of locomotor system,		4	7	7	6	1	6	5	1	5	.....	.....	.....	.....
Males,		2	7	4	5	1	6	4	.....	2	.....	.....	.....	.....
Females,		2	.....	3	1	.....	.....	1	1	3	.....	.....	.....	.....
Diseases of bones,	M.,	2	7	4	4	1	4	3	.....	2	.....	.....	.....	.....
	F.,	2	.....	2	1	.....	.....	1	.....	.....	.....	.....	.....	.....
Diseases of joints,	M.,	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....
	F.,	.....	.....	1	.....	.....	.....	.....	1	3	.....	.....	.....	.....
Other diseases of locomotor system,	M.,	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....
	F.,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
X. Malformations,		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Males,		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Females,		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Hydrocephalus,	M.,													
	F.,													
Congenital malformation of heart (cyanosis),	M.,													
	F.,													
Other congenital malformations,	M.,													
	F.,													
XI. Diseases of early infancy,														
Males,														
Females,														
Premature birth,	M.,													
	F.,													
Congenital debility,	M.,													
	F.,													
XII. Old age,						23	49	154	278	486	388	193	49	2
Males,						7	25	61	123	206	163	84	15	
Females,						16	24	93	155	280	225	109	34	2
XIII. Violence,		764	643	478	359	362	284	223	206	172	101	26	11	31
Males,		687	585	412	306	287	195	140	103	76	37	9	4	29
Females,		77	58	66	53	75	89	83	103	96	64	17	7	2
Suicide,	M.,	71	79	54	56	47	33	25	8	3	3			
	F.,	17	24	12	12	5	4	4	2	1				1
Fractures and dislocations,	M.,	2	3	6	1		4	4	8	10	6	3	1	1
	F.,	1	1		1	5	8	12	21	24	15	5	4	
Burns and scalds,	M.,	11	17	10	7	8	8	1	3	2	1	1		1
	F.,	15	9	14	8	11	13	10	12	4	2			
Heat and sunstroke,	M.,	1	3	2	5	2	1	4	1	1				
	F.,	1					2	3	2	3	1	1		
Cold and freezing,	M.,	5	2	2	2	4			1					
	F.,							1	1	1				
Lightning,	M.,	2	1			2				1				
	F.,				1				2					
Drowning,	M.,	36	25	28	11	12	6	7	3					8
	F.,	1	1	3	1		1	1						
Inhalation of poisonous gases,*	M.,	11	13	12	7	6	7	6	1	2				1
	F.,	4	1	2	5	8	1	1	3	3				

*Includes conflagration.

TABLE 2.—Continued.

Cause of Death.		Age												
		40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
Other accidental poisonings,	M.	16	7	9	9	1	5	2	1	2	.....	.....	.....	.....
	F.	8	4	4	2	.....	11	.....	2	1	.....	.....	.....	.....
Accidental gunshot wounds,	M.	4	2	2	1	1	1	1	1	1	.....	.....	.....	.....
	F.	2	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Injuries by machinery,	M.	20	20	15	7	8	8	1	2	.....	.....	.....	.....	.....
	F.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Injuries in mines and quarries,	M.	162	105	44	39	24	7	4	2	1	.....	1	.....	3
	F.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Railroad accidents and injuries,	M.	167	154	102	51	54	34	25	13	12	4	.....	.....	8
	F.	11	5	9	4	9	4	2	2	2	.....	.....	.....	.....
Street car accidents,	M.	14	9	9	9	12	9	5	5	1	2	.....	.....	2
	F.	1	.....	1	3	1	1	1	2	2	.....	.....	.....	.....
Injuries by vehicles and horses,	M.	20	20	22	10	22	17	10	7	2	.....	.....	.....	.....
	F.	1	2	4	.....	3	1	1	.....	.....	.....	.....	.....	.....
Automobile accidents,	M.	.....	3	2	.....	2	.....	2	.....	.....	.....	.....	.....	.....
	F.	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....
Suffocation	M.	3	1	1	3	1	.....	.....	1	.....	.....	.....	.....	.....
	F.	1	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....
Other accidental injuries,	M.	110	96	87	80	74	53	43	45	38	21	4	3	1
	F.	10	10	15	16	29	40	45	54	55	46	11	3	.....
Injuries at birth,	M.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	F.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homicide,	M.	32	25	5	8	7	2	.....	1	.....	.....	.....	.....	4
	F.	4	1	1	.....	2	1	1	.....	.....	.....	.....	.....	1
XIV. Ill-defined causes,		45	48	68	60	99	108	158	152	113	64	28	4	6

Males	27	28	44	34	58	53	84	80	58	27	13	.....	4
Females	18	20	24	26	41	55	74	72	55	37	15	4	2
"Dropsy," M.	1	5	4	1	4	6	18	8	11	2	3	.....	.....
"Dropsy," F.	5	4	4	4	11	11	15	15	4	8	2	1	.....
"Heart failure," M.	11	14	25	20	25	24	27	22	8	6	2	.....	.....
"Heart failure," F.	7	8	9	9	10	16	16	16	10	6	2	.....	.....
Other ill-defined causes, M.	7	7	11	8	22	16	34	45	35	18	8	.....	2
Other ill-defined causes, F.	2	7	8	11	16	26	38	36	37	20	10	3	2
Unknown causes, M.	8	2	4	5	7	7	5	5	4	1	.....	.....	2
Unknown causes, F.	4	1	3	2	4	2	5	5	4	3	1	.....	.....

TABLE 3.

Deaths by age periods for the entire State, for all municipalities having more than 8,000 population, for certain municipalities by color, and for the rural sections of each county of the State, including municipalities having less than 8,000 population.

(Still-births excluded.)

Area.	All Ages.	Und. 1.	1	2	3	4	Und. 5	5-9	10-14	15-19	20-24	25-29	30-34	35-39
State, total,	115,969	26,229	5,527	2,280	1,379	1,018	36,433	2,710	1,783	3,249	4,868	4,887	4,717	4,997
Total, cities,	58,987	12,938	2,846	1,134	708	517	18,143	1,386	892	1,719	2,613	2,762	2,728	2,919
Allegheny,	2,552	586	184	48	40	18	876	42	39	78	133	152	139	139
Allentown,	761	189	25	17	13	7	251	31	13	22	30	29	26	24
Altoona,	688	160	28	8	9	8	213	16	7	23	37	38	26	29
Beaver Falls,	153	39	5	4	1	2	51	2	3	3	6	6	9	7
Braddock,	468	149	43	19	9	5	225	15	9	17	23	37	23	21
Bradford,	184	15	1	5	4	2	27	3	5	7	3	10	9	8
Butler,	285	62	14	3	.....	1	80	6	4	10	21	25	14	13
Carbondale,	266	57	6	3	2	2	70	4	3	10	8	14	13	20
Carlisle, Total,	172	29	4	1	.....	.....	34	5	3	9	7	5	4	3
White,	138	21	4	.....	.....	.....	25	4	1	8	4	4	3	3
Colored,	34	8	.....	1	.....	.....	9	1	2	1	3	.....	1	.....
Chambersburg,	143	29	7	3	.....	1	40	3	1	6	6	5	4	4
Chester, Total,	587	126	32	18	6	5	187	11	9	19	26	31	27	15
White,	449	95	16	9	5	3	128	10	6	14	12	21	18	11
Colored,	138	31	16	9	1	2	59	1	3	5	14	10	9	4
Columbia,	161	34	5	2	.....	.....	41	.....	2	4	5	3	5	7
Danville,	140	33	7	2	.....	3	44	3	1	1	7	7	6	2
DuBois,	152	42	6	1	3	1	53	7	.....	9	10	9	13	3
Dunmore,	218	62	10	2	2	4	80	6	4	4	8	10	9	13
Duquesne,	231	107	23	7	2	3	142	8	1	11	6	7	7	11
Easton,	474	76	10	8	4	2	100	13	5	11	17	19	23	25
Erie,	979	188	39	16	10	6	259	18	12	26	43	51	32	49
Harrisburg,	869	155	20	9	7	5	196	14	9	33	47	48	44	44
Hazleton,	194	42	5	6	3	2	58	5	3	6	5	7	4	10
Homestead,	306	125	31	13	2	1	172	3	5	9	9	8	7	10
Johnstown,	715	171	36	15	8	15	245	24	10	35	48	43	51	38
Lancaster,	612	100	17	9	2	5	133	12	7	17	16	37	21	22
Lebanon,	277	55	3	.....	3	4	65	6	2	10	10	13	9	7
McKeesport,	884	244	82	22	11	11	370	28	16	30	53	40	37	47
Mahanoy City,	235	87	9	2	5	1	104	5	3	7	11	7	7	12

Meadville,	216	31	6	1	2	1	41	2	2	5	12	4	8	7
Mt. Carmel,	251	89	41	11	5	1	147	10	2	5	1	9	10	6
Nanticoke,	226	72	27	9	7	6	121	13	2	5	8	5	7	3
New Castle,	563	136	28	15	10	4	193	9	10	15	29	31	23	32
Norristown,	628	76	26	14	8	4	128	15	11	12	16	13	22	32
Oil City,	172	35	7	3	3	2	50	4	1	2	8	5	6	13
Philadelphia,	27,476	5,522	1,110	482	310	234	7,658	646	401	724	1,091	1,185	1,255	1,462
Phoenixville,	196	37	11	4	8	1	61	4	1	8	10	5	7	17
Pittsburg,	7,378	1,819	511	173	87	73	2,663	158	121	253	430	434	379	357
Pittston,	267	70	11	8	2	3	94	9	9	9	3	12	13	15
Plymouth,	249	57	30	8	6	3	104	11	7	3	8	9	14	6
Pottstown,	249	45	8	8	2	1	64	4	3	8	10	6	5	15
Pottsville,	364	58	12	4	3	1	78	9	11	13	15	15	23	20
Reading,	1,427	306	44	25	20	17	412	36	16	41	74	55	62	54
Scranton,	1,926	491	99	40	30	19	679	62	46	56	85	96	100	90
Shamokin,	249	69	16	6	2	2	95	4	2	9	11	5	16	12
Sharon,	300	76	17	4	3	1	101	3	5	10	19	21	17	18
Shenandoah,	462	183	50	13	13	4	263	5	7	16	10	17	11	19
South Bethlehem,	292	111	16	10	4	2	143	6	4	11	15	13	12	12
Steelton, Total,	264	100	13	5	2	2	122	5	3	9	20	13	7	17
White,	22	89	12	4	2	.....	107	4	3	8	19	12	6	14
Colored,	36	11	1	1	.....	2	15	1	.....	1	1	1	1	3
Sunbury,	153	22	7	2	3	.....	34	7	.....	5	7	6	9	5
Titusville,	124	12	2	.....	2	.....	16	2	.....	1	3	6	6	2
Warren,	109	12	2	2	1	.....	17	1	4	2	7	5	2	6
West Chester, Total,	248	45	3	2	.....	2	52	2	3	7	13	12	12	7
White,	171	23	1	.....	.....	2	26	2	1	5	5	4	5	7
Colored,	77	22	2	2	.....	.....	26	.....	2	2	8	8	7	.....
Wilkes-Barre,	1,049	229	49	25	7	12	322	35	19	39	51	63	66	60
Wilkinsburg,	230	36	7	3	4	1	51	5	3	8	11	14	6	11
Williamsport,	568	100	18	5	6	3	132	12	13	15	24	26	36	20
York,	645	138	23	9	12	4	186	17	10	11	27	16	25	18
Total, rural,	56,982	13,291	2,681	1,146	671	501	18,290	1,324	891	1,530	2,255	2,125	1,989	2,078
Adams,	440	63	10	8	5	2	88	4	7	6	13	7	15	17
Allegheny,	5,519	1,419	346	110	67	49	1,991	155	84	171	275	276	266	266
Armstrong,	811	180	46	18	9	12	265	23	5	35	30	27	39	25
Beaver,	920	195	39	18	8	6	266	18	15	28	53	43	38	42
Bedford,	551	112	18	9	4	2	145	14	5	9	20	17	23	16
Berks,	1,220	236	32	31	16	7	322	29	25	20	34	28	31	35
Blair,	787	191	37	12	5	6	251	22	15	24	41	27	23	33
Bradford,	848	92	22	12	8	10	144	13	11	17	26	32	26	28
Bucks,	1,129	185	27	9	6	3	220	26	10	29	51	25	19	34
Butler,	613	116	22	11	10	.....	159	6	6	20	20	14	20	30

TABLE 3.—Continued.

Area.	All Ages.	Und. 1.	1	2	3	4	Und. 5	5-9	10-14	15-19	20-24	25-29	30-34	35-39
Cambria,	1,382	491	104	47	32	10	684	42	22	34	59	64	43	48
Cameron,	124	30	1	2	1	2	36	5	2	3	11	7	7	4
Carbon,	767	223	44	20	9	3	299	26	10	16	28	33	18	37
Centre,	563	130	20	4	5	5	164	7	6	12	19	15	24	20
Chester,	1,304	282	49	17	12	8	368	20	23	34	49	36	41	46
Clarion,	444	81	15	5	5	1	107	4	8	11	11	16	20	18
Clearfield,	965	283	45	22	15	9	374	22	18	25	44	39	33	37
Clinton,	397	73	13	6	5	3	100	8	5	13	9	13	16	14
Columbia,	593	116	29	12	9	6	172	17	8	18	22	25	14	21
Crawford,	624	56	17	9	4	2	88	8	8	8	12	18	15	13
Cumberland,	625	99	17	7	6	6	135	13	5	15	15	15	22	17
Dauphin,	855	183	29	9	10	10	241	11	12	11	28	22	31	23
Delaware,	961	167	37	15	8	7	234	20	19	30	52	43	38	38
Elk,	446	108	20	23	9	4	164	11	12	18	31	14	14	20
Erie,	660	66	8	4	2	3	83	7	8	10	21	16	19	12
Fayette,	2,280	772	168	62	34	24	1,060	58	29	78	116	105	104	107
Forest,	83	27	.....	.....	1	.....	28	2	2	2	2	3	3	3
Franklin,	691	146	24	7	4	2	183	10	16	23	27	17	22	21
Fulton,	129	29	5	4	.....	.....	38	2	1	1	3	2	1	7
Greene,	367	57	12	5	7	2	83	6	7	11	14	18	10	12
Huntingdon,	478	87	22	8	2	3	122	13	14	9	18	14	20	11
Indiana,	855	246	53	11	9	11	330	19	19	22	37	31	27	25
Jefferson,	790	201	44	17	10	7	279	20	11	18	32	35	31	31
Juniata,	208	28	3	3	1	1	36	6	6	4	6	8	4	3
Lackawanna,	1,399	455	106	34	23	15	633	39	23	31	34	47	58	52
Lancaster,	1,415	237	33	23	12	7	312	18	21	23	44	30	40	37
Lawrence,	406	84	16	7	5	6	118	4	5	12	23	18	11	10
Lebanon,	485	99	19	8	4	7	137	15	8	18	14	11	15	13
Lehigh,	1,095	299	47	21	8	13	388	32	21	29	38	46	47	28
Luzerne,	2,949	874	239	107	57	51	1,328	102	52	68	98	94	88	115
Lycoming,	538	111	19	4	4	5	143	13	6	11	15	14	11	14
McKean,	422	73	17	5	4	7	106	14	8	12	26	15	12	10
Mercer,	892	182	47	13	12	8	262	18	18	28	38	37	17	22
Mifflin,	429	90	9	7	2	2	110	13	12	15	12	18	21	19
Monroe,	318	50	12	3	3	3	71	11	5	12	13	6	9	9

Montgomery,	1,633	347	58	25	18	17	465	35	32	42	54	55	57	49
Montour,	146	10	2	3	2	.....	17	1	1	3	3	3	7	4
Northampton,	1,116	291	46	26	18	8	389	24	19	32	32	35	29	37
Northumberland,	757	206	40	26	9	9	290	28	17	17	22	29	16	31
Perry,	322	40	9	5	3	1	58	4	4	8	11	9	10	13
Pike,	140	9	2	.....	1	1	13	4	1	5	5	5	7	7
Potter,	370	72	9	5	3	4	93	8	8	9	16	17	14	17
Schuylkill,	2,263	650	104	54	30	28	866	62	36	43	82	81	66	89
Snyder,	212	19	9	5	3	1	37	7	1	2	3	4	5	2
Somerset,	783	231	38	28	13	9	319	19	8	25	39	26	21	18
Sullivan,	148	29	.....	3	1	2	35	2	2	2	6	1	6	4
Susquehanna,	581	96	17	10	6	7	136	8	8	10	16	26	15	16
Tioga,	616	87	14	7	3	6	117	14	12	12	13	12	13	25
Union,	229	35	5	3	.....	.....	43	2	3	.....	5	4	6	3
Venango,	520	79	17	11	3	4	114	9	11	31	23	20	16	25
Warren,	426	42	6	3	4	.....	55	4	4	10	12	13	20	21
Washington,	1,972	527	114	40	18	16	715	56	27	72	95	97	65	76
Wayne,	414	55	6	8	3	3	75	7	9	5	9	11	10	21
Westmoreland,	3,304	891	199	68	41	28	1,227	68	51	129	196	203	170	158
Wyoming,	213	28	6	3	.....	1	33	.....	.....	4	5	12	6	7
York,	1,037	223	38	24	20	6	311	16	13	25	24	21	24	22

TABLE 3.—Continued.

Area.	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95+	Un.
State, total,	4,669	4,751	4,901	5,263	6,150	6,510	6,731	5,933	4,271	2,199	668	172	107
Total, cities,	2,797	2,797	2,814	2,864	3,186	3,165	2,974	2,414	1,645	831	245	66	27
Allegheny,	130	113	106	96	94	116	112	86	58	32	7	1	3
Allentown,	33	38	34	26	42	31	47	41	24	13	4	1	1
Altoona,	41	21	24	43	25	34	36	34	30	7	2	2	.....
Beaver Falls,	5	6	7	3	8	10	11	8	5	1	2	.....	.....
Braddock,	20	23	11	11	10	10	6	4	1	2	.....	.....	.....
Bradford,	8	15	12	20	24	14	7	6	2	3	.....	1	.....
Butler,	7	9	14	17	16	11	12	15	4	6	2	.....	.....
Carbondale,	10	13	10	12	16	18	16	12	10	5	1	1	.....
Carlisle, Total,	5	5	8	10	12	11	22	13	11	3	1	1	.....
White,	5	3	6	6	11	9	17	12	11	3	1	1	.....
Colored,	.....	2	2	4	1	2	5	1	.....	.....	.....	.....	.....

TABLE 3.—Continued.

Area.	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95+	Un.
Chambersburg,	2	7	5	8	7	11	8	16	6	4	.....	.....	.....
Chester, Total,	23	33	35	30	26	30	40	25	13	6	1	.....	.....
White,	17	24	27	28	24	29	36	24	13	6	1	.....	.....
Colored,	6	9	8	2	2	1	4	1	.....	.....	.....	.....	.....
Columbia,	3	10	7	10	16	11	17	10	6	2	1	1	.....
Danville,	6	5	7	5	6	6	15	9	2	7	.....	.....	1
DuBois,	5	3	6	7	7	6	2	5	6	1	.....	.....	.....
Dunmore,	7	8	7	10	12	9	12	8	7	2	2	.....	.....
Duquesne,	6	6	2	3	7	4	5	4	1	.....	.....	.....	.....
Easton,	20	20	21	26	34	35	37	29	18	15	3	2	1
Erie,	32	39	47	52	64	75	73	46	40	14	4	3	.....
Harrisburg,	29	53	39	44	50	56	66	55	24	13	3	2	.....
Hazleton,	17	6	7	11	15	7	15	9	6	2	1	.....	.....
Homestead,	11	12	17	5	9	5	10	6	5	2	.....	1	.....
Johnstown,	36	32	22	20	17	28	26	14	11	13	2	.....	.....
Lancaster,	17	32	33	32	35	45	52	41	35	22	2	1	.....
Lebanon,	8	13	13	7	20	24	26	16	14	10	4	.....	.....
McKeesport,	41	52	31	19	31	25	29	17	11	6	1	.....	.....
Mahanoy City,	9	7	14	7	10	10	8	4	8	1	1	.....	.....
Meadville,	9	11	11	8	12	12	29	17	17	5	4	.....	.....
Mt. Carmel,	7	3	5	8	12	10	6	5	4	1	.....	.....	.....
Nanticoke,	13	6	7	10	7	8	7	1	2	.....	.....	.....	1
New Castle,	25	18	28	15	22	23	24	25	21	16	4	.....	.....
Norristown,	47	29	29	33	45	40	49	46	29	24	7	.....	1
Oil City,	7	7	5	14	12	8	10	7	9	1	2	1	.....
Philadelphia,	422	1,427	1,500	1,486	1,600	1,619	1,422	1,186	811	398	136	35	12
Phoenixville,	7	10	10	7	14	9	5	8	6	7	.....	.....	.....
Pittsburg,	323	342	310	303	326	301	257	207	125	63	19	5	2
Pittston,	11	15	14	13	15	12	10	6	5	1	1	.....	.....
Plymouth,	13	4	13	16	10	16	2	6	4	2	1	.....	.....
Pottstown,	15	9	19	6	17	16	22	14	11	5	.....	.....	.....
Pottsville,	14	16	16	26	21	26	22	18	15	5	.....	1	.....
Reading,	61	64	59	70	103	78	84	72	57	27	2	.....	.....
Scranton,	94	104	66	107	87	92	65	47	32	11	5	2	.....

Shamokin,		9	13	2	14	13	9	8	12	12	2	1	.....	.....
Sharon,		10	3	10	10	20	16	16	12	6	.....	1	.....	2
Shenandoah,		23	15	16	10	15	15	7	6	3	3	.....	.....	1
South Bethlehem,		9	7	11	8	9	5	11	10	3	2	.....	1	.....
Steelton,	Total,	14	4	8	6	11	8	7	4	4	2	.....	.....	.....
	White,	13	4	5	5	8	7	6	4	3	.....	.....	.....	.....
	Colored,	1	.....	3	1	3	1	1	.....	1	2	.....	.....	.....
Sunbury,		11	6	6	4	11	12	10	11	4	4	1	.....	.....
Titusville,		4	8	6	8	17	9	14	9	7	4	1	1	.....
Warren,		4	2	5	6	7	6	10	12	7	5	1	.....	.....
West Chester,	Total,	4	8	12	13	12	18	19	18	15	12	6	1	2
	White,	3	5	11	9	9	12	15	18	15	12	6	.....	1
	Colored,	1	3	1	4	3	6	4	.....	.....	.....	.....	1	1
Wilkes-Barre,		50	43	49	47	58	51	43	23	19	9	2	.....	.....
Wilkinsburg,		9	7	7	16	16	17	19	13	11	4	2	.....	.....
Williamsport,		30	16	22	31	34	36	43	45	16	11	4	2	.....
York,		21	19	29	35	47	51	43	41	32	16	1	.....	.....
Total, rural,		1,872	1,954	2,087	2,399	2,964	3,345	3,757	3,519	2,626	1,368	423	106	80
Adams,		12	8	14	19	23	33	53	52	42	22	4	2	.....
Allegheny,		240	242	213	227	230	224	231	187	131	76	18	6	10
Armstrong,		20	21	29	26	32	47	52	58	36	29	10	1	1
Beaver,		47	42	40	33	35	58	49	52	40	13	6	.....	2
Bedford,		20	16	13	31	33	46	42	45	39	12	3	1	1
Berks,		41	34	46	60	84	110	121	86	65	36	10	2	1
Blair,		20	38	34	27	39	37	50	49	41	8	7	1	.....
Bradford,		22	28	34	57	64	66	83	88	54	38	13	3	1
Bucks,		28	30	56	54	77	74	109	101	93	60	19	4	.....
Butler,		14	22	22	23	43	41	35	56	47	22	11	.....	2
Cambria,		42	33	41	43	39	48	36	44	33	20	4	1	2
Cameron,		4	4	3	8	1	6	10	6	6	1	.....	.....	.....
Carbon,		26	33	28	23	39	42	84	32	30	9	2	1	1
Centre,		15	16	15	28	36	33	48	49	29	23	2	1	1
Chester,		48	41	36	55	75	83	99	104	82	40	17	5	2
Clarion,		12	10	14	24	29	28	36	39	30	20	4	2	1
Clearfield,		24	27	28	34	49	51	50	52	33	17	6	1	1
Clinton,		15	16	11	23	31	21	31	27	26	13	4	.....	1
Columbia,		18	18	15	36	32	36	40	46	30	17	5	3	.....
Crawford,		13	22	33	32	51	65	69	68	53	31	12	3	2
Cumberland,		8	18	22	37	37	58	76	61	39	26	5	.....	1
Dauphin,		33	23	36	49	55	72	66	65	48	18	7	.....	4
Delaware,		40	41	32	43	54	65	63	56	48	30	12	2	1
Elk,		19	19	19	17	21	12	15	21	15	2	2	.....	.....
Erie,		20	24	21	36	65	57	78	81	57	28	15	2	.....

TABLE 3.—Continued.

Area.	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95+	Un.
Fayette,	64	74	60	65	77	81	47	70	47	20	9	3	6
Forest,	1	2	6	5	4	5	2	6	4	2	1	.....	.....
Franklin,	18	18	19	34	42	63	64	59	32	20	2	.....	1
Fulton,	4	2	5	6	9	16	11	7	10	2	2	.....	.....
Greene,	6	8	17	18	17	28	24	32	30	18	6	2	.....
Huntingdon,	10	14	18	20	36	31	50	34	22	15	5	2	.....
Indiana,	30	19	21	30	33	44	48	49	39	35	3	2	1
Jefferson,	25	19	24	28	43	38	49	45	43	9	8	1	1
Juniata,	5	5	8	9	17	21	28	19	16	3	3	.....	1
Lackawanna,	67	62	61	58	55	54	55	37	20	10	1	1	1
Lancaster,	84	43	59	70	91	104	160	142	105	61	16	2	3
Lawrence,	13	9	6	19	24	23	30	31	31	13	5	1	.....
Lebanon,	19	14	16	15	24	39	38	34	35	18	1	1	.....
Lehigh,	37	47	44	42	57	56	53	64	37	18	11	.....	.....
Luzerne,	113	101	125	112	131	132	106	82	53	31	9	3	6
Lycoming,	16	24	24	24	33	47	48	41	28	19	5	1	1
McKean,	11	10	22	24	29	24	29	26	16	13	2	1	2
Mercer,	25	30	31	37	54	54	71	61	53	25	7	3	1
Mifflin,	17	20	18	19	26	27	24	24	23	11	.....	.....	.....
Monroe,	4	14	13	14	21	31	28	25	19	9	4	1	.....
Montgomery,	49	61	58	85	88	116	110	115	88	58	13	5	1
Montour,	7	8	7	11	8	18	16	17	7	6	2	.....	.....
Northampton,	39	31	30	51	63	64	84	69	58	25	2	2	1
Northumberland,	22	18	26	30	34	44	52	44	28	12	4	2	1
Perry,	9	12	13	14	25	28	31	40	16	11	4	1	1
Pike,	3	2	4	9	8	19	13	11	18	3	1	2	.....
Potter,	11	11	21	17	16	20	25	21	26	15	3	2	.....
Schuylkill,	83	89	116	84	118	110	26	110	69	25	11	2	4
Snyder,	8	3	3	9	20	35	28	33	11	1	.....	.....	.....
Somerset,	25	25	26	31	28	35	47	38	32	12	8	1	.....
Sullivan,	3	6	4	11	11	11	15	22	2	2	1	2	.....
Susquehanna,	14	24	21	22	40	38	50	52	51	22	8	4	.....
Tioga,	14	19	35	33	50	42	59	57	47	27	11	3	.....
Union,	7	13	7	12	14	22	28	23	23	12	2	.....	.....
Venango,	10	17	27	24	24	40	48	36	30	9	4	1	1

| | | |

TABLE 4.

Deaths from certain specified causes and classes of causes for each municipality in the State having more than 5,000 population and for the rural sections of each county. (Still-births excluded.)

Area.	All causes.	Typhoid fever.	Malarial fever.	Small-pox.	Measles.	Scarlet fever.	Whooping cough.	Diphtheria.	Influenza.	Other epidemic diseases.	Tuberculosis of lungs.	Other forms of tuberculosis.	Cancer.	Tumor.	Diabetes.
Total, entire State,	115,969	3,538	66	1	714	657	1,287	2,13.	1,697	969	9,317	1,568	4,420	86	842
Allegheny,	2,552	143	4	.....	24	4	61	23	19	15	192	39	71	.....	13
Allentown,	761	22	.....	.....	4	1	5	25	6	4	60	18	16	.....	15
Altoona,	688	28	1	.....	1	4	3	21	3	4	30	13	27	.....	4
Archbald,	114	1	.....	.....	1	3	.....	1	1	.....	2	.....	1	.....	2
Ashland,	94	.....	.....	.....	3	.....	.....	4	.....	.....	4	1	4	.....	2
Bangor,	58	.....	.....	.....	.....	1	3	3	.....	.....	3	2	3	.....	1
Beaver Falls,	153	9	.....	.....	2	2	.....	1	4	2	21	4	2	.....	.....
Bethlehem,	162	2	1	.....	.....	1	1	3	.....	.....	13	3	5	2	6
Bloomsburg,	103	3	.....	.....	1	.....	3	7	2	.....	6	2	5	.....	4
Braddock,	468	29	1	.....	.....	.....	4	5	.....	6	28	7	7	1	1
Bradford,	184	1	.....	.....	2	.....	1	6	3	2	9	3	13	.....	1
Bristol,	124	2	.....	.....	1	1	9	.....	.....	.....	18	.....	6	.....	1
Butler,	285	13	.....	.....	1	.....	2	3	3	2	17	5	13	.....	2
Carbondale,	266	1	.....	.....	.....	.....	3	5	2	4	17	2	12	.....	2
Carlisle,	172	4	1	.....	.....	.....	3	1	3	1	21	2	9	.....	.....
Carnegie,	132	3	.....	.....	1	.....	6	1	2	.....	7	3	4	.....	1
Chambersburg,	143	2	.....	.....	.....	.....	3	5	1	1	9	3	2	.....	.....
Charleroi,	94	4	.....	.....	.....	.....	2	1	2	.....	4	.....	3	.....	1
Chester,	587	16	2	.....	.....	.....	7	7	14	5	55	12	24	1	5
Clearfield,	109	1	.....	.....	.....	2	3	3	1	.....	8	2	5	.....	1
Coatesville,	176	2	.....	.....	2	.....	.....	4	1	.....	17	2	8	.....	3
Columbia,	161	4	.....	.....	2	1	.....	.....	.....	2	9	3	4	1	1
Connellsville	159	7	.....	.....	1	.....	1	1	1	.....	11	.....	2	.....	.....
Conshohocken	104	2	1	.....	1	.....	2	2	3	.....	12	.....	1	.....	1

Corry,	86		1		1	2			3		6		3		1
Danville,	140	8		5	1	1				14	2	11			
Dickson City,	123	1		1	1				1	2	3	2		1	
DuBois,	152	9			2		3	1	1	7	5	6		1	
Dunmore,	218	3	2		4	2	5	1		14		3		2	
Duquesne,	231	9		4		7	10	1	1	8	2	5		1	
Easton,	474	12		6	1	8	13	3	3	31	4	21	2	7	
Edwardsville,	141	1	1	1	11	1	4	3		5		2		2	
Erie,	979	48		9	4	2	24	5	8	73	13	61	1	2	
Etna,	91	3			1	5	1			11		1			
Forest City,	94				10	3	2	1		1	1	3			
Franklin,	106	2		1		2		2		8		7		1	
Freeland,	71	1				6	1		1	2	1	4			
Greensburg,	229	22					1	3	1	11	1	6		2	
Greenville,	84	3				1	3		1	7		1	6	3	
Hanover,	88	2		1			1	2	1	16	1	6			
Harrisburg,	869	28		3			3	10	3	64	7	40		8	
Hazleton,	194	2			4	2	7	1		13		9	1	1	
Homestead,	306	6		8		6	4		5	26	5	6		3	
Huntingdon,	92	5					6	4		2	1	5		2	
Indiana,	74	6				1		3		5	1	1		3	
Jeannette,	79	1					3	1		7	3	3			
Johnstown,	715	35		3	7	1	28	1	3	61	11	14	1	6	
Johnsonburg,	48	6		1		1	1			1		4			
Kane,	93	6			1			1		5	1	2		1	
Lancaster,	612	8	1	2	4	1	5	8		51	11	38	1	10	
Lansford,	105	1		1	1	8		2		8		1		2	
Latrobe,	130	6		1		1	4	4	1	9	1	1		1	
Lebanon,	277	2		1			10	4	4	12	4	9		1	
Lehighton,	54	1		1	1			4		4		1			
Lewistown,	114	7				1	2	2		17	3	6		1	
Lock Haven,	123	6						4	1	10	3	6		3	
McKeesport,	884	43	1	15	7	2	19	4	5	63	10	10	2		
McKees Rocks,	226	10		1	2	8	3	1		13	3	2		3	
Mahanoy City,	235	2			2		5		1	7	1	7		1	
Meadville,	216	6				2		9	2	15	2	17		2	
Middletown,	87			4			3		1	6	2	5			
Millvale,	103	6			1	5		1		20	2	4			
Milton,	84					3		2	1	6		2		1	
Minerville,	102						1	1		7		4		1	
Monongahela,	108	5			1	1	5	1		6		6	2		
Mount Carmel,	251	2	1	21	5	2	6	3	11	8	2	3			
Mount Pleasant,	121	4				1	2			12	3	4			
Nanticoke,	226	1			15	6	6	3		3		10			
New Brighton,	132	11			1	5	1	1		8	3	5			

TABLE 4. —Continued.

Area.	All causes.	Typhoid fever.	Malarial fever.	Small-pox.	Measles.	Scarlet fever.	Whooping cough.	Diphtheria.	Influenza.	Other epidemic diseases.	Tuberculosis of lungs.	Other forms of tuberculosis.	Cancer.	Tumor.	Diabetes.
New Castle,	563	28	.....	.....	3	2	8	6	12	5	22	7	12	.....	3
Norristown,	628	9	.....	.....	17	6	4	7	9	8	36	11	23	1	5
North Braddock,	171	3	.....	.....	2	4	1	2	1	.....	11	.....	2	.....	1
Oil City,	172	3	1	.....	1	.....	2	.....	1	2	9	1	5	.....	3
Old Forge,	176	1	.....	.....	1	1	4	5	1	.....	10	.....	1	.....	.....
Olyphant,	108	1	.....	.....	3	2	1	4	3	1	2	.....	.....	.....	1
Philadelphia,	27,476	890	12	.....	99	120	214	494	307	132	3,261	456	1,193	12	180
Phoenixville,	196	13	.....	.....	3	.....	1	.....	.....	1	10	2	4	.....	.....
Pittsburg,	7,378	502	3	.....	44	42	144	107	78	37	430	104	239	4	38
Pittston,	267	.....	.....	.....	.....	1	2	14	2	.....	11	1	7	.....	2
Plymouth,	249	1	.....	.....	5	17	.....	13	1	5	14	2	11	.....	.....
Pottstown,	249	9	2	.....	3	2	5	2	2	3	13	1	10	.....	.....
Pottsville,	364	8	1	.....	.....	1	.....	4	2	3	23	4	20	1	5
Punxsutawney,	123	6	.....	.....	1	2	.....	2	1	1	7	3	6	.....	3
Reading,	1,427	43	.....	.....	21	7	7	35	16	13	95	9	59	1	15
Rochester,	125	15	.....	.....	.....	.....	1	1	1	1	11	2	5	1	1
Saint Clair,	96	1	.....	.....	.....	.....	1	3	1	.....	3	2	2	.....	2
Saint Marys,	68	3	.....	.....	3	.....	.....	.....	2	.....	6	.....	2	.....	1
Sayre,	125	6	1	.....	1	1	.....	7	4	1	3	2	4	.....	.....
Scottdale,	69	3	.....	.....	1	.....	3	1	1	1	4	.....	6	.....	1
Scranton,	1,926	92	1	.....	8	27	9	60	31	12	100	16	63	1	9
Shamokin,	249	3	.....	.....	3	.....	5	5	3	5	20	1	7	1	1
Sharon,	300	24	.....	.....	4	1	2	3	2	1	15	4	9	2	.....
Sharpsburg,	115	3	.....	.....	4	1	1	3	1	.....	6	4	7	.....	.....
Shenandoah,	462	1	.....	.....	2	2	2	16	2	5	19	2	12	.....	2
S. Bethlehem, Northampton Co.,	292	2	.....	.....	1	2	2	12	2	4	24	.....	7	.....	3
Steelton,	264	9	.....	.....	7	.....	1	5	6	2	24	2	7	.....	.....
Sugar Notch,	48	.....	.....	.....	3	3	1	5	.....	.....	.....	.....	.....	.....	.....
Sunbury,	153	8	1	.....	.....	1	1	3	1	2	5	3	5	.....	5
Tamaqua,	112	3	.....	.....	.....	1	.....	3	1	.....	6	1	7	.....	.....

Tarentum,	106	9					1	2	4		4		5		
Titusville,	124	1							2		6	1	5		2
Tyrone,	93	1						1	1		6	2	3		1
Uniontown, Fayette Co.,	243	26					3			2	16	4	6		1
Warren,	109	4							2		7		5		2
Washington,	229	5			1	1	6	1	9		18	1	8		2
Waynesboro,	106	2			1		4		1	1	11	2	7		3
West Chester,	248	13				1	2	2	2	2	19	2	9	1	4
West Pittston,	84	2					1	4	2		6		7		1
Wilkes-Barre,	1,049	28	2		3	12	18	20	15	5	50	7	41		9
Wilkinsburg,	230	8			1	3	3	2	7	2	14	2	14		2
Williamsport,	568	21				2	6	13	9	6	35	3	34	2	9
Wilmerding,	93						3	1		1	11		3		
York,	645	14			2		10	13	6	8	52	12	36		3
Total, rural, exclusive of all cities and boroughs,	34,779	675	18	1	219	192	441	660	712	84	2,477	384	1,274	32	225
Adams county,	279	2		1	3	1		3	9		22	1	16		2
Allegheny county,	2,768	72	1		12	14	47	41	17	3	317	65	60		6
Armstrong county,	469	13				1	3	8	11	1	31	2	15		4
Beaver county,	324	6			1	1	1	4	5		18	1	12		1
Bedford county,	417	21				3	15	8	16		32	3	12		
Blair county,	434	8				5	4	9	5	2	31		16		3
Bradford county,	506	1			3	4	3	8	30	4	33	7	28	1	3
Berks county,	907	24	1		10	6	2	29	21	3	69	5	47		14
Bucks county,	718	13	1		1	2	8	3	20	1	66	9	26		11
Butler county,	501	6			1	1	6	4	10	2	32	4	30		3
Cambria county,	827	23	1		12	1	10	30	13	1	31	14	14	2	1
Cameron county,	66	1				2		1	2		4		2		
Carbon county,	332	2			2	4	7	8	5	2	18	2	20	2	1
Centre county,	405	6				3	5	4	8	1	21	6	16		2
Chester county,	914	24			3		7	10	21	1	75	21	46	1	6
Clarion county,	323	15					4	5	9	1	17		14	1	1
Clearfield county,	675	20			6	3	20	11	6	4	45	8	17	1	6
Clinton county,	186	2			2	1		3	4		10	3	6		3
Columbia county,	270	5			6		1	7	15	1	17	1	12		3
Crawford county,	486	6			2		4	2	22	3	31	4	14		9
Cumberland county,	384	3			1	4		5	6	1	46	4	14	2	4
Dauphin county,	546	11	1		1	3	2	4	9	1	49	3	15	2	2
Delaware county,	507	10			1	4	5	9	11		59	11	17		3
Elk county,	232	5			7	2	1	5	3	1	10	1	5		3
Erie county,	406	3			1			5	16	1	10	4	31	1	4
Fayette county,	1,607	56			26	6	35	32	10	3	83	11	29	1	4
Forest county,	74	1	1		1		1		2			1	4		2
Franklin county,	550	11			4	2	4	5	11		62	7	22		1
Fulton county,	119					1	5		3		11		3		
Greene county,	280	6					3	3	13	1	33	4	9		4

TABLE 4.—Continued.

Area.	All causes.	Typhoid fever.	Malarial fever.	Small-pox.	Measles.	Scarlet fever.	Whooping cough.	Diphtheria.	Influenza.	Other epidemic diseases.	Tuberculosis of lungs.	Other forms of tuberculosis.	Cancer.	Tumor.	Diabetes.
Huntingdon county,	248	7	.....	.....	.....	2	2	4	9	1	25	4	14	.....	2
Indiana county,	668	18	.....	.....	4	3	6	16	14	2	35	8	17	1	3
Jefferson county,	521	14	.....	.....	1	.....	14	11	16	2	26	6	21	.....	6
Juniata county,	152	2	.....	.....	.....	1	.....	1	2	.....	23	4	5	.....	2
Lackawanna county,	378	2	.....	.....	2	4	7	11	7	2	32	6	8	.....	2
Lancaster county,	1,117	21	3	.....	10	3	3	5	25	2	94	15	46	1	6
Lawrence county,	217	13	.....	.....	3	.....	5	4	8	.....	20	.....	10	1	2
Lebanon county,	487	5	.....	.....	4	1	6	22	4	2	36	5	13	.....	4
Lehigh county,	707	10	.....	.....	9	1	12	18	9	1	49	8	30	1	9
Luzerne county,	1,568	11	.....	.....	14	60	26	53	23	5	85	10	34	3	2
Lycoming county,	394	5	.....	.....	.....	4	10	5	27	2	18	1	21	.....	2
McKean county,	263	1	.....	.....	3	.....	2	6	7	.....	16	3	16	1	3
Mercer county,	400	3	1	.....	2	.....	9	5	4	.....	25	2	19	.....	1
Mifflin county,	297	5	1	.....	.....	1	2	13	5	.....	27	3	8	1	1
Monroe county,	214	.....	.....	.....	.....	.....	4	7	9	1	10	.....	10	.....	3
Montgomery county,	1,148	18	.....	.....	4	4	16	21	27	2	104	20	45	1	11
Montour county,	144	2	.....	.....	1	2	1	3	3	.....	13	1	12	.....	1
Northampton county,	558	9	.....	.....	2	.....	11	12	5	2	50	6	26	1	8
Northumberland county,	557	3	.....	.....	12	2	8	18	11	2	41	4	11	1	1
Perry county,	207	2	2	.....	1	.....	.....	2	2	.....	19	2	10	.....	.....
Pike county,	94	2	.....	.....	.....	.....	.....	2	7	.....	5	.....	2	.....	3
Potter county,	200	3	.....	.....	.....	.....	.....	1	11	2	10	2	11	1	3
Schuylkill county,	1,133	10	1	.....	7	9	9	36	13	4	75	6	39	.....	2
Snyder county,	186	3	.....	.....	.....	.....	.....	2	1	1	14	5	11	.....	2
Somerset county,	462	7	.....	.....	5	9	3	19	6	1	21	.....	19	.....	4
Sullivan county,	127	.....	1	.....	.....	.....	2	.....	5	.....	7	.....	13	.....	1
Susquehanna county,	291	2	.....	.....	.....	2	.....	2	13	1	17	3	11	1	6
Tioga county,	420	8	.....	.....	1	.....	4	5	22	.....	21	5	21	1	3
Union county,	161	2	.....	.....	1	.....	.....	.....	1	.....	10	2	13	.....	1
Venango county,	293	14	.....	.....	.....	.....	4	1	7	2	14	1	14	.....	5

| | | |

TABLE 4.—Continued.

	Meningitis.	Other nervous diseases.	Diseases of the circulatory system.	Pneumonia.	Other respiratory diseases.	Diarrhea and Enteritis.		Other diseases of the digestive system.	Bright's disease.	Childbirth.	Early infancy.	Suicide.	Other violence.	Ill-defined causes.	All other causes.	Cause unknown.
						Under 2 years.	2 years and over.									
Total, entire State	1,272	10,955	11,777	7,849	6,535	8,622	1,351	6,064	6,471	1,312	5,604	892	9,974	2,596	7,113	402
Allegheny	25	178	175	292	224	209	30	145	78	30	118	34	205	66	135	.....
Allentown	16	89	66	44	28	63	7	30	51	9	41	2	71	28	40	.....
Altoona	13	77	72	64	25	40	5	40	30	9	46	5	62	9	52	.....
Archibald	3	8	8	12	11	15	1	6	1	.....	12	.....	20	1	4	.....
Ashland	.....	11	10	10	5	5	.....	6	2	.....	5	1	12	5	3	.....
Bangor	1	8	5	2	7	1	.....	3	1	1	6	1	2	1	1	2
Beaver Falls	2	13	11	9	10	14	1	5	7	1	4	.....	12	6	11	.....
Bethlehem	.....	23	15	14	3	12	.....	10	12	2	14	.....	6	1	13	.....
Bloomsburg	.....	10	21	10	1	.....	2	10	3	.....	3	.....	4	.....	6	.....
Braddock	4	16	17	44	78	73	9	21	8	3	25	1	54	5	21	.....
Bradford	3	13	36	15	7	3	.....	14	13	4	4	1	11	1	16	2
Bristol	3	14	14	6	5	6	.....	1	3	1	10	.....	5	.....	17	1
Butler	4	21	23	16	7	27	2	16	9	9	11	5	52	6	16	.....
Carbondale	3	20	24	20	21	16	3	14	21	3	14	.....	37	6	15	1
Carlisle	3	18	26	10	7	8	3	10	9	.....	5	1	4	7	16	.....
Carnegie	1	12	8	11	9	18	1	8	4	3	11	1	6	3	8	.....
Chambersburg	1	23	25	12	5	4	1	8	7	2	8	3	5	4	9	.....
Charleroi	5	9	11	6	3	8	1	6	2	.....	13	.....	6	4	3	.....
Chester	5	60	58	46	36	36	10	28	36	5	31	3	39	24	22	.....
Clearfield	.....	9	10	8	3	3	.....	8	7	1	10	.....	8	2	9	.....
Coatesville	2	6	15	10	14	14	3	4	4	2	16	1	25	4	13	1
Columbia	.....	13	39	12	7	5	2	6	7	3	9	.....	11	5	15	.....
Connellsville	.....	14	8	14	5	4	.....	7	2	.....	7	4	48	6	14	2
Conshohocken	2	8	11	7	5	6	2	6	6	1	5	1	5	2	12	.....
Corry	.....	15	12	6	3	2	2	8	.....	1	2	2	4	1	11	.....
Danville	.....	14	9	16	7	7	1	7	7	3	10	1	8	.....	7	1
Dickson City	4	10	8	2	10	20	1	8	4	3	16	1	21	.....	3	.....
DuBois	1	12	12	12	11	8	.....	8	6	2	15	1	20	1	8	.....
Dunmore	5	32	21	19	9	17	5	7	8	1	17	1	22	6	12	.....

Duquesne,	6	10	6	20	13	54	1	9	2	4	14	.....	27	9	8	.....
Easton,	1	60	55	31	15	20	7	28	24	8	15	7	50	10	25	7
Edwardsville,	3	6	6	16	8	22	.....	6	6	2	10	1	13	6	3	2
Erie,	1	98	128	59	37	57	8	98	61	13	44	9	49	2	65	.....
Etna,	2	5	11	10	1	7	1	4	.....	.....	6	.....	9	2	10	1
Forest City,	1	2	2	2	14	13	.....	8	2	3	6	.....	12	2	4	1
Franklin,	.....	11	11	6	4	8	1	8	1	1	4	3	5	2	17	.....
Freeland,	1	4	4	7	3	6	.....	7	3	3	5	1	5	1	4	1
Greensburg,	.....	17	17	14	8	8	1	16	5	4	12	5	58	4	13	.....
Greenville,	4	7	13	5	.....	3	.....	.....	3	.....	2	.....	8	.....	5	.....
Hanover,	1	9	9	2	4	6	1	3	5	1	2	.....	5	1	9	.....
Harrisburg,	7	96	108	68	39	30	10	43	58	6	46	10	101	22	57	2
Hazleton,	3	19	31	12	16	14	1	8	17	3	8	4	9	2	6	1
Homestead,	1	21	12	34	9	60	4	9	15	1	24	4	22	9	12	.....
Huntingdon,	1	6	5	5	3	3	.....	3	4	.....	2	1	19	3	10	.....
Indiana,	.....	8	8	4	2	3	4	3	5	1	3	1	4	2	5	1
Jeannette,	3	2	9	3	4	3	.....	5	4	.....	11	1	11	3	2	.....
Johnsonburg,	1	4	2	1	2	2	1	4	2	.....	4	.....	6	2	2	1
Johnstown,	12	56	33	56	20	49	6	37	34	7	53	5	106	29	33	8
Kane,	1	8	11	14	6	4	1	6	2	2	4	.....	6	2	8	1
Lancaster,	3	66	97	26	19	38	8	42	43	9	22	6	30	6	57	.....
Lansford,	.....	4	6	3	6	19	1	8	2	1	8	2	16	.....	4	1
Latrobe,	.....	15	11	6	5	9	.....	9	1	1	11	.....	10	1	18	4
Lebanon,	1	37	29	20	8	19	6	10	21	1	10	.....	25	19	24	.....
Lehighton,	1	7	5	2	3	1	2	4	2	1	1	2	7	.....	4	.....
Lewistown,	.....	7	10	5	3	4	1	4	5	1	8	1	8	.....	18	.....
Lock Haven,	.....	11	22	5	5	2	2	6	12	.....	6	1	8	2	8	.....
McKeesport,	12	74	53	86	57	90	15	47	23	6	59	14	94	28	36	.....
McKees Rocks,	3	12	9	29	11	36	3	15	4	1	17	3	25	9	3	.....
Mahanoy City,	2	40	11	14	27	19	2	8	14	5	12	.....	19	17	19	.....
Meadville,	2	20	35	8	6	8	1	11	14	1	8	3	20	4	20	.....
Middletown,	.....	7	15	4	5	5	1	6	4	.....	7	.....	3	.....	8	.....
Millvale,	2	8	8	4	5	9	.....	4	5	.....	6	.....	3	3	6	1
Milton,	.....	12	10	5	3	2	1	11	2	1	11	3	3	1	4	.....
Minerville,	.....	5	9	9	5	14	4	7	5	1	8	2	11	1	7	.....
Monongahela,	1	10	12	7	8	8	2	4	3	.....	12	1	10	2	1	.....
Mount Carmel,	2	21	11	21	14	37	2	11	9	3	11	.....	22	11	12	.....
Mount Pleasant,	.....	14	7	10	6	13	1	14	6	2	3	1	7	1	9	2
Nanticoke,	1	17	8	39	13	30	3	5	12	.....	14	1	26	11	2	.....
New Brighton,	2	15	13	17	8	3	.....	6	2	1	6	1	14	.....	9	.....
New Castle,	10	54	42	48	31	37	5	49	27	8	18	8	42	19	43	14
Norristown,	4	80	111	21	51	33	9	15	50	5	11	3	44	4	31	.....
North Braddock,	1	5	10	13	24	21	4	8	2	3	14	1	31	.....	7	.....
Oil City,	13	21	22	5	6	8	.....	10	9	3	9	3	21	2	12	.....
Old Forge,	5	8	14	20	16	15	.....	8	8	3	20	.....	15	4	11	5

TABLE 4.—Continued.

	Meningitis.	Other nervous diseases.	Diseases of the circulatory system.	Pneumonia.	Other respiratory diseases.	Diarrhea and Enteritis.		Other diseases of the digestive system.	Bright's disease.	Childbirth.	Early infancy.	Suicide.	Other violence.	Ill-defined causes.	All other causes.	Cause unknown.
						Under 2 years.	2 years and over.									
Olyphant,	1	6	8	8	7	14	2	9	7	.....	8	1	12	4	2	1
Philadelphia,	316	1,955	3,336	1,667	1,548	1,886	289	1,311	2,604	287	1,171	227	1,529	475	1,503	2
Phoenixville,	7	27	15	22	6	9	.....	9	12	3	9	.....	23	4	17	.....
Pittsburg,	73	446	535	538	749	706	94	407	277	96	443	85	630	105	422	.....
Pittston,	.....	27	14	24	31	25	4	15	5	7	11	.....	43	8	12	1
Plymouth,	3	14	16	23	19	21	5	7	12	3	8	.....	21	13	15	.....
Pottstown,	1	28	32	23	9	16	5	15	10	1	10	1	22	9	15	.....
Pottsville,	6	19	46	28	16	23	3	35	28	3	12	1	46	.....	26	.....
Punxsutawney,	1	7	7	5	6	12	3	8	8	4	7	1	15	.....	5	.....
Reading,	15	203	165	57	60	97	14	84	102	12	58	17	104	29	89	.....
Rochester,	1	3	12	2	7	7	.....	5	4	3	2	.....	35	2	3	.....
Saint Clair,	2	8	4	3	15	13	.....	5	5	3	9	.....	9	1	4	.....
Saint Marys,	3	4	7	6	2	2	2	8	2	.....	4	.....	6	.....	5	.....
Sayre,	.....	9	5	6	4	4	1	17	3	.....	1	1	24	3	17	.....
Scottdale,	.....	4	4	7	2	5	1	3	2	.....	6	.....	9	.....	4	.....
Scranton,	30	186	151	126	130	202	23	95	79	29	80	8	225	22	110	1
Shamokin,	1	28	22	20	12	16	2	13	12	5	17	1	21	12	13	.....
Sharon,	1	27	21	22	16	23	4	12	11	1	21	5	39	8	17	5
Sharpsburg,	1	8	6	10	14	3	.....	11	1	.....	10	3	5	1	12	.....
Shenandoah,	5	31	18	41	31	98	7	21	11	7	27	1	54	27	17	1
S. Bethlehem, Northampton Co.,	2	24	19	27	20	43	2	13	8	1	18	1	29	11	13	2
Steelton,	3	24	10	19	14	36	1	15	8	7	19	2	19	6	18	.....
Sugar Notch,	3	1	1	3	2	3	3	3	3	1	3	.....	7	2	1	.....
Sunbury,	2	19	19	4	8	7	2	9	4	7	8	1	16	3	9	.....
Tamaqua,	1	8	12	6	11	8	2	7	4	.....	8	1	14	2	6	.....
Tarentum,	1	6	13	12	6	9	1	8	3	1	6	1	7	.....	7	.....
Titusville,	1	24	23	11	5	1	.....	9	5	.....	2	5	2	4	14	1
Tyrone,	2	11	7	4	3	4	4	5	9	3	9	.....	8	2	7	.....
Uniontown, Fayette Co.,	3	15	14	28	4	7	2	17	6	1	9	2	49	6	22	.....
Warren,	.....	6	13	5	5	2	2	14	4	2	3	1	7	2	17	1

Washington,	2	28	18	15	9	6	2	26	7	5	12	2	21	2	22	.....
Waynesboro,	.....	6	14	4	1	12	3	1	6	1	2	3	3	.....	8	.....
West Chester,	3	25	30	12	8	11	3	17	21	3	11	.....	21	9	16	1
West Pittston,	.....	12	4	7	4	4	3	5	3	2	6	.....	4	3	4	.....
Wilkes-Barre,	10	82	81	71	67	91	9	71	37	12	54	2	168	19	61	4
Wilkinsburg,	4	19	27	21	13	6	1	20	11	5	12	1	11	3	18	.....
Williamsport,	8	58	74	31	24	20	4	44	26	5	31	5	33	15	50	.....
Wilmerding,	4	2	7	9	5	9	2	9	1	.....	7	2	9	1	7	.....
York,	1	82	81	36	32	50	12	27	37	3	32	7	43	2	34	.....
Total, rural, exclusive of all cities and boroughs.	306	3,837	3,362	2,331	1,711	2,149	530	1,905	1,378	375	2,098	226	3,331	526	2,942	378
Adams county,	1	49	39	11	14	9	7	17	8	1	15	3	17	2	24	2
Allegheny county,	14	323	212	185	155	190	49	140	80	18	174	32	299	26	212	4
Armstrong county,	2	37	42	24	29	31	12	21	17	4	22	2	46	9	64	9
Beaver county,	2	35	25	21	19	18	9	19	11	4	21	.....	43	2	32	3
Bedford county,	4	47	36	21	15	19	12	25	12	5	18	.....	31	12	39	11
Blair county,	2	51	35	30	22	27	2	26	19	8	31	2	48	8	39	1
Bradford county,	6	51	80	26	27	4	14	24	28	5	18	4	22	8	55	9
Berks county,	3	170	121	49	41	38	18	70	42	9	57	5	44	15	80	4
Bucks county,	8	103	98	46	25	24	13	33	46	3	32	7	47	8	63	2
Butler county,	6	44	51	36	27	28	10	27	29	9	21	4	44	2	53	11
Cambria county,	11	38	56	68	53	108	9	33	20	14	86	1	102	10	59	7
Cameron county,	.....	6	7	3	4	5	1	3	2	.....	4	.....	14	1	4	.....
Carbon county,	1	38	24	28	18	27	4	11	10	3	29	1	32	8	22	3
Centre county,	4	57	53	27	20	15	6	27	15	5	25	5	19	9	33	13
Chester county,	7	109	110	49	37	43	9	26	60	11	50	10	70	14	90	4
Clarion county,	5	31	40	17	12	17	12	25	10	4	13	1	28	6	34	1
Clearfield county,	9	55	55	44	45	41	7	41	32	16	43	4	46	11	62	17
Clinton county,	3	21	19	9	2	16	1	7	6	3	12	2	19	13	15	4
Columbia county,	3	41	23	23	18	12	7	11	11	3	7	.....	9	4	30	.....
Crawford county,	3	75	74	26	23	11	11	36	28	3	10	5	26	2	54	2
Cumberland county,	3	58	41	18	14	15	10	25	22	3	18	2	24	6	30	5
Dauphin county,	5	103	62	31	25	22	11	31	21	4	30	3	34	6	54	1
Delaware county,	4	53	65	20	22	29	10	33	28	6	30	.....	41	4	32	.....
Elk county,	3	27	19	32	5	9	4	7	6	5	18	4	22	3	21	4
Erie county,	1	56	54	28	10	6	1	28	32	7	18	2	29	6	51	1
Fayette county,	17	65	79	123	54	195	18	102	27	14	139	6	226	56	111	79
Forest county,	1	10	3	7	3	3	.....	4	2	1	7	.....	4	4	10	2
Franklin county,	4	78	59	25	28	32	5	35	23	8	38	3	29	6	45	3
Fulton county,	3	11	18	7	10	7	1	8	5	1	9	.....	5	2	9	.....
Greene county,	2	28	30	12	17	7	5	23	11	3	13	1	19	2	28	3

TABLE 4.—Continued.

	Meningitis.	Other nervous diseases.	Diseases of the circulatory system.	Pneumonia.	Other respiratory diseases.	Diarrhea and Enteritis.		Other diseases of the digestive system.	Bright's disease.	Childbirth.	Early infancy.	Suicide.	Other violence.	Ill-defined causes.	All other causes.	Cause unknown.
						Under 2 years.	2 years and over.									
Huntingdon county,	2	21	29	13	9	14	1	13	8	2	16	.....	10	5	29	6
Indiana county,	10	48	45	56	37	62	9	39	25	6	56	5	74	16	43	10
Jefferson county,	8	38	46	24	45	31	6	32	20	7	39	.....	48	9	43	8
Juniata county,	2	22	26	5	5	4	.....	6	1	.....	10	.....	11	2	16	2
Lackawanna county,	7	52	31	27	21	27	6	12	15	2	22	.....	42	2	25	4
Lancaster county,	7	174	160	75	51	40	17	63	66	9	58	10	58	9	83	3
Lawrence county,	2	32	31	21	16	19	6	27	13	3	21	3	22	4	23	8
Lebanon county,	3	66	50	25	15	18	8	25	22	10	41	1	30	8	61	2
Lehigh county,	6	102	56	47	37	52	7	29	41	4	39	5	55	12	56	2
Luzerne county,	14	130	96	142	112	137	13	83	48	20	100	3	198	34	99	13
Lycoming county,	4	44	42	33	19	14	6	18	21	4	27	1	33	6	26	1
McKean county,	2	22	29	28	7	13	4	12	13	4	16	2	21	3	27	2
Mercer county,	4	55	48	37	11	13	4	24	21	3	21	6	29	6	43	3
Mifflin county,	1	28	42	13	11	17	4	17	13	4	20	1	34	2	23	.....
Monroe county,	1	29	15	8	11	10	5	24	11	2	10	3	13	2	21	5
Montgomery county,	11	131	120	66	58	70	19	54	52	10	64	15	90	13	98	4
Montour county,	1	35	17	5	7	4	2	9	6	1	3	.....	5	.....	9	1
Northampton county,	3	74	53	31	32	32	8	29	20	10	27	5	40	3	53	6
Northumberland county,	6	46	55	51	26	42	10	28	00	00	24	2	52	14	49	2
Perry county,	1	27	34	13	7	1	2	9	00	3	11	2	12	4	30	4
Pike county,	3	9	15	7	5	1	1	1	8	2	1	.....	9	.....	10	1
Potter county,	4	19	26	12	7	4	1	19	11	4	11	2	13	1	20	2
Schuylkill county,	6	96	64	104	85	98	14	56	37	14	83	5	155	17	88	5
Snyder county,	.....	41	32	13	9	3	4	3	15	1	2	2	7	.....	10	5
Somerset county,	2	53	43	16	11	36	9	26	13	7	39	6	49	10	38	10
Sullivan county,	1	14	10	8	11	2	1	5	7	2	6	1	10	1	17	2
Susquehanna county,	6	49	52	21	7	6	2	17	3	4	10	2	17	1	31	5
Tioga county,	2	49	49	26	23	18	9	31	18	3	19	3	21	5	51	2
Union county,	1	28	20	11	3	4	.....	6	9	1	18	1	10	2	15	2
Venango county,	3	34	37	28	7	11	2	20	13	2	11	1	24	7	28	3

| | | |

TABLE 5.

Date from each specified cause for the entire State and for certain cities. (Still-births excluded.)

	Total.	Cities.	Rural.	Philadelphia.	Pittsburg.	Allegheny.	Scranton.	Erie.	Harrisburg.	Reading.	Wilkes-Barre.	Allentown.	Altoona.	Chester.	Easton.	Johnstown.	Lancaster.	McKeesport.	New Castle.	Norristown.	Williamsport.	York.
All causes,	115,969	58,987	56,982	27,476	7,378	2,552	1,926	979	869	1,427	1,049	761	688	587	474	715	612	884	563	628	568	645
General Diseases.																						
Typhoid fever,	3,538	2,230	1,308	890	502	143	92	48	28	43	28	22	28	16	12	35	8	43	28	9	21	14
Exanthematic typhus,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Relapsing fever,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Malarial fever,	66	37	29	12	3	4	1	.....	.....	.....	2	....	1	2	....	....	1	1	....	....	....	....
Small-pox,	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Measles,	714	340	374	99	44	24	8	9	3	21	3	4	1	....	6	3	2	15	3	17	....	2
Scarlet fever,	657	317	340	120	42	4	27	4	.....	7	12	1	4	....	1	7	4	7	2	6	2	....
Whooping cough,	1,287	582	705	214	144	61	9	2	.....	7	18	5	3	7	8	1	1	2	8	4	6	10
Diphtheria,	1,688	905	783	443	91	21	48	18	3	26	16	23	19	6	12	23	2	16	4	4	8	12
Croup,	450	181	269	51	16	2	12	6	.....	9	4	2	2	1	1	5	3	3	2	3	5	1
Influenza,	1,697	632	1,065	307	78	19	31	5	10	16	15	6	3	14	3	1	8	4	12	9	9	6
Miliary fever,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Asiatic cholera,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cholera nostras,	110	50	60	19	5	1	1	2	.....	2	.....	1	....	2	1	....	....	1	2	....	1	1
Dysentery,	416	109	307	28	7	7	6	2	1	5	.....	1	1	2	1	2	....	2	2	4	2	4
Plague,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yellow fever,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leprosy,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Erysipelas,	250	188	162	81	24	6	5	4	2	6	5	2	3	1	1	1	....	2	....	4	3	3
Other epidemic diseases,	33	11	22	4	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Septicemia,	216	95	121	20	12	4	7	2	.....	4	8	1	....	3	....	1	2	3	2	2	3	....
Glanders and farcy,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Malignant pustule and charbon,	6	5	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rabies,	12	2	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Actinomycosis, trichinosis, etc.,	3	2	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pellagra,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tuberculosis of lungs,	9,317	5,272	4,045	3,261	430	192	100	73	64	95	50	60	30	55	31	61	51	63	22	56	35	52
Tuberculosis of larynx,	99	59	40	33	12	.....	1	.....	.....	.....	1	.....	.....	.....	1	2	2	1	1	.....	.....	.....
Tuberculous meningitis,	525	330	195	203	35	17	7	7	1	4	2	8	3	2	2	4	4	5	1	.....	.....	5
Abdominal tuberculosis,	451	243	208	124	33	12	3	4	3	3	3	2	5	2	1	1	2	2	3	5	2	3

Pott's disease,	82	33	49	12	5	.....	2	.....	1	.....	.....	1	....	....	1	....	1	1	2	....	1
Tuberculous abscess,	10	6	4	3	.....	.....	1	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....
White swelling,	41	23	18	11	3	3	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Tuberculosis of other organs,	107	57	50	25	7	3	1	1	.....	1	1	2	1	4	.....	2	1	.....	.....	1	1
General tuberculosis,	193	92	101	45	9	4	.....	1	2	1	.....	5	2	4	....	2	1	....	1	4	....	1
Scrofula,	19	7	12	2	1	.....	.....	.....	1	2	.....	....	1	....	.....	.....	.....	.....	.....	.....	.....	.....
Syphilis,	337	206	131	102	36	9	5	6	2	2	2	3	1	....	1	1	1	....	2	4	....	4
Gonorrhea (5 years and over),	3	1	2	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gonorrhea (under 5 years),	4	2	2	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cancer of mouth,	144	71	73	45	4	2	3	3	1	1	3	....	....	1	....	....	....	....	....	1	....	....
Cancer of stomach and liver,	1,666	839	827	395	101	34	24	28	14	16	16	7	11	11	4	7	11	10	4	9	12	17
Cancer of intestines and peritoneum,	488	284	204	149	23	8	13	3	7	8	3	3	5	2	4	2	6	2	....	4	4	4
Cancer of female genital organs,	640	395	245	206	41	18	6	9	8	21	4	3	6	3	6	1	12	3	2	1	6	1
Cancer of breast,	368	203	165	116	13	4	2	5	2	4	2	1	2	2	....	1	2	1	1	....	3	7
Cancer of skin,	188	86	102	52	5	.....	3	2	2	.....	2	1	....	2	....	1	1	....	1	....	2	1
Cancer of other or unspecified organs,	926	438	488	230	52	5	12	11	6	9	11	1	3	3	7	2	6	3	4	8	7	6
Tumor,	86	37	49	12	4	.....	1	1	.....	1	.....	....	....	1	2	1	1	2	....	1	2	....
Acute articular rheumatism,	405	224	181	92	30	9	9	6	3	3	7	2	2	2	2	2	6	4	3	6	....	1
Chronic rheumatism and gout,	195	77	118	29	7	7	1	.....	1	2	3	2	1	....	....	3	2	1	1	1	4	....
Diabetes,	842	391	451	180	38	13	9	2	8	15	9	15	4	5	7	6	10	....	3	5	9	3
Exophthalmic goiter,	62	37	25	10	5	2	1	2	2	1	4	....	1	....	....	....	....	1	1	1	2	....
Addison's disease,	19	9	10	2	2	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Leukemia,	94	57	37	33	8	2	2	.....	2	3	.....	1	....	....	....	....	2	.....	.....	.....	.....	.....
Anemia, chlorosis,	263	129	134	63	11	3	4	3	2	1	4	1	2	1	1	....	....	3	4	....	1	
Alcoholism,	401	218	183	86	47	17	7	4	5	4	3	....	3	1	1	3	....	1	3	1	3	2
Lead poisoning,	12	9	3	4	3	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other occupational poisoning,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other chronic poisonings,	22	7	15	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
Scurvy,	7	3	4	.....	2	.....	.....	.....	.....	.....	.....	....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other general diseases,	27	7	20	3	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
II. Diseases of Nervous System.																						
Encephalitis,	107	48	59	21	2	2	1	.....	1	3	1	1	2	.....	.....	1	1	1	.....	.....	.....	2
Meningitis (simple or unqualified),	894	419	475	133	52	25	26	1	6	13	7	14	10	5	1	11	3	12	9	4	7	1
Epidemic cerebro-spinal meningitis,	378	239	139	183	21	.....	4	.....	1	2	3	2	3	.....	.....	1	.....	.....	1	.....	1	.....
Locomotor ataxia,	193	104	89	55	6	6	2	4	.....	2	2	5	3	.....	.....	.....	.....	1	2	.....	3	1
Other diseases of spinal cord,	379	183	196	97	19	4	2	11	.....	8	7	5	4	....	2	....	6	2	3	1	....	1
Apoplexy,	5,382	2,393	2,989	1,024	202	82	92	43	50	114	45	58	40	42	42	14	43	25	26	41	31	58
Softening of brain,	213	85	128	40	2	4	3	6	2	1	.....	2	1	1	2	.....	.....	.....	1	1	1	5
Paralysis,	1,421	503	918	230	36	8	13	7	15	15	7	5	10	5	4	6	2	3	7	8	15	5
General paralysis of insane,	258	89	169	39	5	.....	.....	9	5	3	2	....	2	1	1	1	2	....	1	14	....	2
Other forms of mental disease,	274	63	211	23	16	3	2	2	.....	1	.....	2	....	....	1	3	1	2	....	....	....	....
Other diseases of brain,	274	147	127	76	24	3	3	1	1	3	3	....	1	1	1	3	....	3	1	1	3	....
Epilepsy,	310	105	205	53	14	5	3	3	.....	3	.....	1	2	....	....	1	2	....	....	8	....	1
"Convulsions" (5 years and over),	49	18	31	5	3	1	1	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2	.....	.....	.....	.....
"Convulsions" (under 5 years),	1,656	795	861	219	90	51	52	5	17	43	15	8	10	7	5	24	7	32	9	2	4	4
Tetanus,	159	71	88	32	10	.....	6	3	1	2	.....	1	....	2	....	....	....	2	1	2	1	1

TABLE 5.—Continued.

	Total.	Cities.	Rural.	Philadelphia.	Pittsburg.	Allegheny.	Scranton.	Erie.	Harrisburg.	Reading.	Wilkes-Barre.	Allentown.	Altoona.	Chester.	Easton.	Johnstown.	Lancaster.	McKeesport.	New Castle.	Norristown.	Williamsport.	York.
Chorea,	19	6	13	1	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	1
Other diseases of nervous system,	139	63	76	19	8	5	2	2	2	1	.....	1	.....	.....	1	.....	1	.....	3	1	.....	.....
Diseases of eye and adnexa,	12	7	5	2	4	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Diseases of ear,	110	63	47	29	5	4	4	1	2	4	.....	.....	1	.....	1	1	.....	1	.....	1	.....	1
III. Diseases of Circulatory System.																						
Pericarditis	87	37	50	17	3	2	1	4	.....	1	.....	1	2	.....	.....	.....	1	.....	1	.....	1	1
Endocarditis,	579	406	173	235	25	4	7	1	2	7	2	1	9	3	.....	.....	3	2	1	3	7	3
Heart disease,	9,282	4,664	4,618	2,408	432	153	112	112	86	136	62	44	51	50	47	29	78	47	35	96	45	53
Angina pectoris,	498	233	265	104	17	3	2	3	4	11	4	13	4	1	2	1	6	....	1	1	6	7
Diseases of arteries,	946	614	332	405	30	7	22	6	13	8	5	5	5	4	4	1	9	2	3	9	10	17
Embolism and thrombosis,	207	121	86	74	16	2	2	1	2	.....	4	2	1	....	2	2	....	1	....	2	2	....
Diseases of veins,	33	15	18	7	2	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Diseases of lymphatics,	8	5	3	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Hemorrhages,	132	63	69	23	10	2	4	1	1	3	4	....	....	....	....	....	....	....	....	....	3	....
Other diseases of circulatory system,	5	1	4	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
IV. Diseases of Respiratory System.																						
Diseases of nasal fossa,	23	7	16	3	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	1	.....	.....	.....	.....	.....	....
Laryngitis,	72	30	42	10	2	1	2	.....	.....	1	3	.....	.....	1	1	.....	.....	1	.....	.....	1	....
Other diseases of larynx,	101	41	60	19	3	3	2	.....	.....	4	.....	2	2	.....	.....	.....	.....	1	.....	.....	1	....
Diseases of thyroid body,	14	8	6	3	1	.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Acute bronchitis,	1,183	705	478	292	158	53	32	6	5	12	16	5	1	4	1	1	4	14	7	9	4	5
Chronic bronchitis,	789	446	343	197	57	38	11	5	5	4	8	....	2	5	4	3	2	6	5	3	6	10
Bronchopneumonia,	2,915	1,689	1,226	709	420	88	46	19	15	26	14	13	8	20	6	6	10	26	14	26	8	15
Pneumonia (lobar and unqualified),	7,849	4,027	3,822	1,667	538	232	126	59	68	57	71	44	64	46	31	56	26	86	48	21	31	36
Pleurisy,	306	196	110	83	37	7	15	2	3	4	3	1	1	2	1	2	....	3	2	1	1	....
Congestion of lungs,	495	266	229	144	24	15	4	2	3	5	3	2	6	2	....	2	1	1	1	8	3	1
Gangrene of lungs,	31	15	16	4	2	1	1	1	1	1	1	....	....	....	....	1	....	....	....	....	....	....
Asthma,	283	140	143	31	30	10	5	1	5	3	13	1	1	1	....	3	....	4	2	3	....	1
Emphysema,	32	15	17	9	1	.....	.....	1	.....	.....	1	....	1	....	1	.....	.....	.....	.....	.....	.....	.....
Hemorrhage of lungs,	96	48	48	21	5	4	2	.....	.....	.....	2	1	2	1	1	.....	.....	.....	.....	1	.....	.....
Other diseases of respiratory system,	195	80	115	23	9	4	9	.....	2	.....	4	1	.....	.....	.....	1	2	1	.....	.....	.....	.....

V. Diseases of Digestive System.																							
Diseases of mouth,	69	28	41	15	1	1	2	.....	.....	.....	.....	....	2	....	....	.....	.....	.....	1	.....	....	1
Tonsilitis,	99	25	74	7	5	.....	1	.....	.....	2	.....	....	2	....	1	.....	.....	.....	.....	1	....	1
Diseases of pharynx,	32	12	20	4	3	.....	.....	.....	.....	1	1	.....	.....	....	1	.....	.....	.....	.....	.....	.....	.....
Diseases of esophagus,	29	13	16	6	1	1	.....	.....	.....	1	.....	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ulcer of stomach,	172	89	83	41	8	4	3	3	2	3	.....	.....	.....	1	1	1	1	2	.....	2	1	2
Gastritis,	834	368	466	159	47	14	12	7	5	10	4	6	2	3	3	3	10	8	5	....	9	8
Other diseases of stomach,	747	313	434	95	42	21	8	37	3	8	8	....	3	6	1	2	2	2	12	1	3	3
Dentition,	52	31	21	16	6	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Diarrhea and enteritis (under 2 years),	8,622	4,522	4,100	1,886	706	209	202	57	39	97	91	63	40	36	20	49	38	90	37	33	20	50
Diarrhea and enteritis (2 years and over),	1,351	653	698	289	94	30	23	8	10	14	9	7	5	10	7	6	8	15	5	9	4	12
Intestinal parasites,	9	.....	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hernia,	310	179	131	103	17	4	7	2	3	6	3	....	3	2	4	3	2	2	.....	.....	1	.....
Obstruction of intestines,	666	361	305	144	56	13	14	9	8	8	12	2	2	3	7	8	3	8	5	2	7	6
Other diseases of intestines,	177	90	87	37	11	5	3	2	.....	2	2	....	3	2	2	1	1	1	1	....	1	1
Acute yellow atrophy of liver,	36	12	24	5	3	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
Hydatid tumors of liver,	2	2	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cirrhosis of liver,	962	551	411	292	70	31	9	22	4	14	15	3	9	.....	1	3	6	6	2	3	1	3
Biliary calculi,	175	93	82	42	15	4	2	.....	1	1	2	.....	.....	1	1	2	3	1	2	2	2	1
Other diseases of liver,	508	223	285	87	38	9	7	4	3	9	4	6	3	5	2	3	1	2	7	2	2	3
Diseases of spleen,	12	8	4	3	2	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Peritonitis,	499	221	278	48	28	19	10	1	2	9	5	4	5	4	4	4	2	9	3	2	4	.....
Appendicitis,	652	442	210	202	49	18	14	11	11	9	15	7	4	1	....	6	10	6	11	....	12	8
Other diseases of digestive system,	22	11	11	4	5	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
VI. Diseases of Genito-Urinary System.																						
Acute nephritis,	710	449	261	249	45	13	15	8	12	10	2	3	3	5	4	3	4	5	3	6	5	6
Bright's disease,	5,761	3,605	2,156	2,355	232	65	64	53	46	92	35	48	27	31	20	31	39	18	24	44	21	31
Other diseases of kidney,	214	103	111	55	11	4	1	3	2	2	.....	....	2	....	2	....	2	....	2	.....	....	2
Calculi of urinary tract,	36	21	15	10	4	1	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Diseases of bladder,	245	89	156	31	9	1	3	3	.....	3	3	1	5	....	2	2	4	1	....	3	1	1
Diseases of urethra, urinary abscess, etc.,	19	14	5	5	4	.....	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Diseases of prostate,	223	109	114	48	15	4	3	1	.....	3	3	2	1	1	2	....	1	1	1	1	3	4
Nonvenereal diseases of male genital organs,	5	2	3	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nephritis,	17	10	7	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
Uterine hemorrhage,	12	7	5	3	3	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Uterine tumor,	123	85	38	42	12	3	3	2	2	3	2	.....	.....	1	.....	.....	1	.....	1	.....	.....	1
Other diseases of uterus,	80	49	31	16	9	4	2	6	.....	2	3	.....	.....	1	.....	2	.....	1	.....	.....	.....	.....
Ovarian tumor,	61	38	23	19	2	1	.....	1	.....	3	.....	.....	1	1	.....	1	3	.....	.....	.....	.....	1
Diseases of tubes,	128	102	26	36	26	4	2	.....	2	3	2	.....	2	.....	.....	.....	2	4	3	.....	3	1
Other diseases of female genital organs,	21	13	8	2	2	1	.....	1	2	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....
Nonpuerperal diseases of breast (cancer excepted),	4	3	1	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
VII. Childbirth.																						
Accidents of pregnancy,	161	94	67	47	17	3	2	3	.....	2	1	.....	.....	.....	3	1	1	.....	1	1	.....	.....
Puerperal hemorrhage,	87	41	46	19	2	2	2	1	.....	3	.....	.....	.....	.....	.....	.....	2	1	.....	.....	.....	1

TABLE 5.—Continued.

	Total.	Cities.	Rural.	Philadelphia.	Pittsburg.	Allegheny.	Scranton.	Erie.	Harrisburg.	Reading.	Wilkes-Barre.	Allentown.	Altoona.	Chester.	Easton.	Johnstown.	Lancaster.	McKeesport.	New Castle.	Norristown.	Williamsport.	York.
Other accidents of labor,	97	59	38	27	9	3	.....	2	.....	.....	4	1	....	1	1	1	1	....	....	1	....	....
Puerperal septicemia,	519	262	257	104	41	15	15	5	3	5	3	5	4	1	1	2	2	....	5	2	3	2
Puerperal convulsions,	315	156	159	71	18	5	7	2	3	2	3	3	4	3	2	3	2	2	1	1	1	....
Puerperal phlegmasia alba dolens,	5	2	3	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other puerperal accidents,	127	52	75	18	9	2	3	.....	.....	.....	1	....	1	....	1	....	1	3	1	....	1	....
Puerperal diseases of breast,	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
VIII. Diseases of Skin.																						
Gangrene,	289	112	177	61	6	.....	2	2	2	2	1	....	3	1	3	....	3	2	1	1	3	2
Carbuncle,	40	24	16	8	2	.....	3	1	.....	2	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....
Abscess,	98	37	61	14	4	2	2	1	.....	1	1	1	....	....	1	....	...	1	2	....	....	....
Other diseases of skin,	88	38	50	18	4	.....	2	.....	.....	1	.....	.....	.....	.....	.....	2	.....	.....	1	....	2	1
IX. Diseases of Locomotor System.																						
Diseases of bones,	165	86	79	41	11	2	4	.....	2	1	2	3	....	1	....	2	2	1	....	....	4	2
Diseases of joints,	16	8	8	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Amputation,	2	2	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other diseases of organs of locomotion,	2	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
X. Malformations.																						
Hydrocephalus,	104	48	56	21	4	2	3	3	1	2	1	1	....	....	1	....	1	1	1	....	....	....
Congenital malformation of heart (cyanosis),	1,029	488	541	223	56	14	10	6	12	24	5	12	8	3	2	1	10	3	9	2	6	7
Other congenital malformations,	363	162	201	73	26	9	11	5	1	2	2	1	1	....	....	2	1	7	3	....	1	....
XI. Diseases of Early Infancy.																						
Premature birth,	2,892	1,442	1,450	578	220	63	43	37	27	33	21	25	22	15	12	27	13	26	9	8	14	26
Congenital debility,	2,433	1,240	1,193	548	200	54	33	7	17	24	29	14	21	15	3	25	7	30	8	3	16	5
Other diseases of early infancy,	247	107	140	43	23	1	4	.....	2	1	4	2	3	1	....	1	2	3	1	....	1	1
Lack of care,	32	4	28	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
XII. Old Age.																						
Old age,	1,622	615	1,007	310	43	36	17	3	12	12	5	9	17	5	6	9	11	2	4	5	13	2
XIII. Violence.																						
Suicide by poison,	251	167	84	52	42	18	1	4	5	6	1	....	2	1	2	4	4	6	2	....	1	1
Suicide by asphyxia,	51	50	1	43	1	.....	1	.....	1	1	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	1
Suicide by hanging or strangulation,	160	74	86	36	10	3	2	2	2	2	.....	.....	.....	.....	1	.....	.....	3	.....	.....	.....	3

Suiced by drowning,	41	21	20	13	1	1	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	1	.....	1	.....
Suicide by firearms,	275	133	142	53	23	8	2	3	2	5	1	1	2	2	3	.....	.....	3	5	2	1	1
Suicide by cutting instruments,	64	42	22	20	7	1	2	.....	.....	3	.....	.....	1	.....	.....	1	.....	1	.....	.....	2	.....
Suicide by jumping from high places,	15	10	5	6	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
Suicide by crushing,	10	3	7	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other suicides,	25	6	19	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Fractures,	163	65	98	29	3	1	.....	1	2	1	9	5	.....	.....	2	1	.....	.....	1	1	.....	.....
Dislocations,	3	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Burns and scalds,	971	491	480	175	81	15	12	4	12	14	23	8	3	3	4	12	2	11	4	5	1	7
Heat and sunstroke,	140	97	43	62	13	9	2	.....	.....	.....	.....	1	.....	.....	2	.....	.....	.....	.....	1	.....	.....
Cold and freezing,	28	8	20	.....	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lightning,	23	3	20	1	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Drowning,	566	235	331	117	24	19	4	9	2	5	3	2	1	6	1	2	.....	4	4	3	4	4
Inhalation of poisonous gases,	135	108	27	79	8	5	1	.....	.....	4	2	3	.....	1	.....	.....	.....	1	.....	.....	1	.....
Conflagration,	68	30	38	10	6	1	1	.....	.....	.....	.....	5	.....	1	.....	2	.....	.....	.....	.....	.....	.....
Other accidental poisonings,	302	133	169	46	18	6	8	2	2	5	1	3	3	1	1	2	2	1	3	1	3	6
Accidental gunshot wounds,	139	52	87	11	10	4	4	3	1	.....	2	.....	1	.....	2	1	.....	2	1	1	.....	1
Injuries by machinery,	275	142	133	41	27	11	4	.....	8	.....	1	4	2	1	.....	2	1	6	2	1	.....	2
Injuries in mines,	1,508	323	1,185	.....	24	3	92	.....	.....	.....	63	.....	1	.....	1	22	.....	6	.....	.....	.....	.....
Injuries in quarries,	36	13	23	1	.....	.....	.....	.....	2	.....	1	1	.....	1	3	.....	.....	.....	1	.....	.....	.....
Railroad accidents (steam or unqualified),	2,134	854	1,280	164	111	50	37	11	42	27	29	15	33	7	19	35	9	30	8	11	13	4
Street car accidents (surface or unqualified),	261	184	77	96	32	13	6	1	5	4	1	4	1	2	.....	1	1	4	1	1	1	.....
Street car accidents (elevated),	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Street car accidents (underground),	1	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Injuries by vehicles and horses,	297	125	172	64	11	8	3	2	1	4	2	2	1	.....	1	1	1	.....	.....	2	2	.....
Automobile accidents,	36	29	7	11	10	4	1	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Suffocation,	124	35	89	16	2	.....	.....	1	.....	.....	1	.....	2	.....	1	1	.....	.....	.....	2	.....	1
Injuries at birth,	502	261	141	108	45	4	12	3	6	8	8	2	1	3	4	1	2	1	1	3	.....	3
Other accidental traumatism,	1,695	958	737	398	158	43	27	11	13	20	16	15	8	9	7	16	7	22	12	8	7	12
Burning by corrosive substances,	3	3	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Other external violence,	153	55	98	14	11	.....	3	1	2	3	.....	1	2	.....	2	.....	4	.....	.....	2	.....	.....
Starvation, privation, etc.,	5	2	3	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homicide,	406	217	189	84	32	8	7	.....	3	7	5	.....	3	4	.....	6	1	6	4	2	1	3
XIV. Ill-Defined Causes.																						
"Dropsy,"	172	37	135	4	5	2	1	.....	2	1	.....	1	1	.....	.....	1	.....	1	.....	.....	.....	.....
"Heart failure,"	437	127	310	7	6	3	5	.....	7	14	2	8	2	.....	2	7	.....	6	3	.....	2	.....
Sudden death,	63	10	53	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....
Unspecified or ill-defined causes of death,	168	29	139	2	1	1	1	.....	1	.....	.....	1	.....	.....	2	1	.....	.....	3	.....	.....	.....
Inanition (over 3 months),	365	222	143	96	43	17	.....	1	1	1	2	3	.....	3	1	4	1	9	4	1	2	1
Debility (over 3 months),	338	112	226	37	3	9	.....	.....	4	1	5	2	2	3	1	7	1	2	4	1	.....	1
Marasmus (over 3 months),	1,009	619	390	329	47	33	15	1	7	12	10	13	4	17	4	6	4	9	4	2	11	.....
Fever,	44	8	36	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	1	1	.....	.....	.....
Unknown causes,	402	55	347	2	.....	.....	1	.....	2	.....	4	.....	.....	.....	7	8	.....	.....	14	.....	.....	.....

TABLE 6.

Deaths by Age, Sex, Color, General Nativity and Parent Nativity. (Still-birth excluded.)

Areas.	All ages.	Under 1	1	2	3	4	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
Total,	115,969	26,229	5,527	2,280	1,379	1,018	36,433	2,710	1,783	3,249	4,868	4,887	4,717	4,997
Males,	63,891	14,670	2,931	1,188	745	521	20,055	1,408	979	1,828	2,968	2,959	2,769	3,032
Females,	52,078	11,559	2,596	1,092	634	497	16,378	1,302	804	1,421	1,900	1,928	1,948	1,965
White,	110,945	25,074	5,188	2,175	1,302	966	34,705	2,594	1,664	3,044	4,540	4,570	4,407	4,694
Males,	61,208	14,046	2,743	1,130	710	504	19,133	1,347	930	1,742	2,796	2,778	2,582	2,850
Females,	49,737	11,028	2,445	1,045	592	462	15,572	1,247	734	1,302	1,744	1,792	1,825	1,844
Native,	84,606	24,826	5,040	2,083	1,224	923	34,096	2,425	1,543	2,336	2,951	2,828	2,872	2,916
Males,	44,927	13,910	2,668	1,079	672	480	18,809	1,268	857	1,235	1,579	1,507	1,474	1,584
Females,	39,679	10,916	2,372	1,004	552	443	15,287	1,157	686	1,101	1,372	1,321	1,398	1,332
Both parents native, Total,	48,097	12,310	2,313	1,103	661	494	16,881	1,462	944	1,507	1,905	1,699	1,596	1,579
Both parents native, M.,	25,022	6,856	1,213	584	349	263	9,265	753	509	789	999	908	800	806
Both parents native, F.,	23,075	5,454	1,100	519	312	231	7,616	709	435	718	906	791	796	773
One or both parents foreign, Total,	28,445	11,780	2,631	942	547	402	16,302	917	541	734	850	908	1,012	1,049
One or both parents foreign, M.,	15,541	6,635	1,406	478	314	204	9,037	485	317	388	473	473	534	621
One or both parents foreign, F.,	12,904	5,145	1,225	464	233	198	7,265	432	224	346	377	435	478	428
Parentage unknown, Total,	8,064	736	96	38	16	27	913	46	58	95	196	221	264	288
Parentage unknown, M.,	4,364	419	49	17	9	13	507	30	31	58	107	126	140	157
Parentage unknown, F.,	3,700	317	47	21	7	14	406	16	27	37	89	95	124	131
Foreign,	24,865	187	138	89	75	43	532	159	118	686	1,483	1,647	1,410	1,639
Males,	15,165	100	68	49	38	24	279	74	70	491	1,126	1,182	994	1,149
Females,	9,700	87	70	40	37	19	253	85	48	195	357	465	416	490
Unknown,	1,474	61	10	3	3	.....	77	10	3	22	106	95	125	139
Males,	1,116	36	7	2	.....	.....	45	5	3	16	91	89	114	117
Females,	358	25	3	1	3	.....	32	5	.....	6	15	6	11	22
Colored,	5,024	1,155	339	105	77	52	1,728	116	119	205	328	317	310	303
Males,	2,683	624	188	58	35	17	922	61	49	86	172	181	187	182
Females,	2,341	531	151	47	42	35	806	55	70	119	156	136	123	121
Black, Total,	4,976	1,151	338	105	77	52	1,723	116	119	204	324	310	305	296
Black, M.,	2,642	622	187	58	35	17	919	61	49	85	169	174	182	176
Black, F.,	2,334	529	151	47	42	35	804	55	70	119	155	136	123	120

Indian,	Total,	12	3	1	.....	.....	.....	4	.....	.....	1	3	.....	.....	.....	
	M.,	7	1	1	.....	.....	.....	2	.....	.....	1	2	.....	.....	.....	
	F.,	6	2	.....	.....	.....	.....	2	.....	.....	.....	1	.....	.....	.....	
Chinese,	Total,	28	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	3	4	6	
	M.,	27	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	3	4	5	
	F.,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	
Japanese,	Total,	7	1	.....	.....	.....	.....	1	.....	.....	.....	.....	4	1	1	
	M.,	7	1	.....	.....	.....	.....	1	.....	.....	.....	.....	4	1	1	
	F.,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	

TABLE 6.—Continued.

Areas.	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
Total,	4,669	4,751	4,901	5,263	6,150	6,510	6,731	5,933	4,271	2,199	668	172	107
Males,	2,798	2,808	2,870	2,951	3,420	3,418	3,385	2,899	1,979	968	281	52	64
Females,	1,871	1,943	2,031	2,312	2,730	3,092	3,346	3,034	2,292	1,231	387	120	43
White,	4,370	4,513	4,683	5,074	5,973	6,352	6,620	5,851	4,202	2,168	661	159	101
Males,	2,638	2,675	2,739	2,853	3,320	3,347	3,325	2,862	1,950	952	279	50	60
Females,	1,732	1,838	1,944	2,221	2,653	3,005	3,295	2,989	2,252	1,216	382	109	41
Native,	2,613	2,806	3,020	3,135	3,715	4,023	4,375	3,949	2,866	1,542	466	97	32
Males,	1,408	1,493	1,655	1,676	1,987	2,099	2,181	1,919	1,315	651	189	30	11
Females,	1,205	1,313	1,365	1,459	1,728	1,924	2,194	2,030	1,551	891	277	67	21
Both parents native, Total,	1,379	1,518	1,775	1,957	2,467	2,638	2,964	2,675	1,842	963	275	53	18
Both parents native, M.,	726	766	923	1,008	1,297	1,383	1,445	1,296	828	403	105	11	2
Both parents native, F.,	653	752	852	949	1,170	1,255	1,519	1,379	1,014	560	170	42	16
One or both parents foreign, Total,	924	935	834	693	646	584	549	399	329	173	53	5	8
One or both parents foreign, M.,	506	517	494	372	334	283	265	194	144	68	26	3	7
One or both parents foreign, F.,	418	418	340	321	312	301	284	205	185	105	27	2	1
Parentage unknown, Total,	310	353	411	485	602	801	862	875	695	406	138	39	6
Parentage unknown, M.,	176	210	238	296	356	433	471	429	343	180	58	16	2
Parentage unknown, F.,	134	143	173	189	246	368	391	446	352	226	80	23	4
Foreign,	1,625	1,595	1,563	1,864	2,171	2,241	2,173	1,811	1,271	603	185	59	30
Males,	1,114	1,089	994	1,123	1,273	1,191	1,102	896	604	293	85	19	17
Females,	511	506	569	741	898	1,050	1,071	915	667	310	100	40	13

TABLE 6.—Continued.

Areas.	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
Unknown,	132	112	100	75	87	88	72	91	65	23	10	3	39
Males,	116	93	90	54	60	57	42	47	31	8	5	1	32
Females,	16	10	10	21	27	31	30	44	34	15	5	2	7
Colored,	299	238	218	189	177	158	111	82	69	31	7	13	6
Males,	160	133	131	98	100	71	60	37	29	16	2	2	4
Females,	139	105	87	91	77	87	51	45	40	15	5	11	2
Black, Total,	296	235	212	186	176	155	110	82	68	31	7	13	6
Black, M.,	157	132	127	95	100	68	59	37	28	16	2	2	4
Black, F.,	139	105	85	91	76	87	51	45	40	15	5	11	2
Indian, Total	.....	.....	2	.....	1	1	.....	.....	1	.....	.....	.....	.....
Indian, M.,	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....
Indian, F.,	.....	.....	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Chinese, Total,	3	1	4	3	.....	2	1	.....	.....	.....	.....	.....	.....
Chinese, M.,	3	1	4	3	.....	2	1	.....	.....	.....	.....	.....	.....
Chinese, F.,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Japanese, Total,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Japanese, M.,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Japanese, F.,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 7.

Deaths by Age, Color, General Nativity and Parent Nativity for each municipality having more than 8,000 population and for the rural sections of each county, including those municipalities having less than 8,000 population. (Still-births excluded.)

Area.	Aggregate.	White.	Native.	Both par. nat.	Both par. for.	Both par. un.	F.-N. M.-F.	M.-N. F.-F.	F.-N. M.-Un.	M.-N. F.-Un.	F.-N. M.-Un.	M.-F. F.-Un.	Both par. X.	For.	Un.	Col.	Negro.	Ind.	Chi.	Jap.
State total,	115,969	110,945	84,606	48,097	21,751	5,238	1,980	4.010	1,775	1,051	549	155	....	24,865	1,474	5,024	4,976	13	28	7
Total cities,	58,987	55,253	39,070	19,409	12,489	2,590	1,165	2,160	547	384	235	91	....	15,471	712	3,734	3,690	10	27	7
Allegheny,	2,552	2,458	1,614	664	641	51	68	117	39	12	19	3	....	798	46	94	91	1	2	....
Allentown,	761	758	651	478	115	17	8	20	7	5	1	.....	....	98	9	3	3	....	....	....
Altoona,	688	670	552	410	70	16	11	19	13	9	4	.....	....	117	1	18	18	....	....	....
Beaver Falls,	153	152	120	56	32	11	2	4	4	3	7	1	....	32	.....	1	1	....	....	....
Braddock,	468	440	294	79	181	3	5	18	4	1	2	1	....	140	6	28	28	....	....	....
Bradford,	184	180	132	74	28	7	6	5	7	2	1	2	....	42	6	4	4	....	....	....
Butler,	285	284	214	120	58	16	5	7	5	2	1	.....	....	70	.....	1	1	....	....	....
Carbondale,	266	266	193	104	58	5	5	14	1	3	2	1	....	72	1	.....	.....	....	....	....
Carlisle,	172	138	133	108	3	10	1	2	5	3	1	.....	....	4	1	34	32	2	....	....
Chambersburg,	143	121	109	90	4	3	3	5	3	1	.....	.....	....	10	2	22	22	....	....	....
Chester,	587	449	307	171	61	26	14	16	10	2	5	2	....	131	11	138	138	....	....	....
Columbia,	161	155	130	105	9	6	1	4	2	2	1	.....	....	24	1	6	6	....	....	....
Danville,	140	139	120	86	13	5	3	7	3	1	2	.....	....	19	.....	1	1	....	....	....
Dubois,	152	152	114	62	39	2	2	7	1	1	.....	.....	....	37	1	.....	.....	....	....	....
Dunmore,	218	216	144	57	53	16	5	9	1	1	2	.....	....	66	6	2	2	....	....	....
Duquesne,	231	226	174	31	124	6	1	9	2	.....	1	.....	....	52	.....	5	5	....	....	....
Easton,	474	463	369	284	44	9	3	15	9	5	.....	.....	....	85	9	11	11	....	....	....
Erie,	979	974	670	271	221	90	30	47	7	4	.....	.....	....	297	7	5	5	....	....	....
Harrisburg,	869	780	652	543	50	14	5	22	7	8	2	1	....	124	4	89	89	....	....	....
Hazleton,	194	193	136	61	46	6	2	15	3	3	.....	.....	....	57	.....	1	1	....	....	....
Homestead,	306	277	204	51	128	8	5	6	1	3	1	1	....	73	.....	29	29	....	....	....
Johnstown,	715	707	497	246	161	31	7	26	16	5	5	.....	....	207	3	8	8	....	....	....
Lancaster,	612	591	486	384	58	4	9	20	6	2	3	.....	....	103	2	21	21	....	....	....
Lebanon,	277	276	245	158	16	34	2	7	21	5	2	.....	....	25	6	1	1	....	....	....
McKeesport,	884	859	594	219	306	8	25	29	4	2	.....	1	....	251	14	25	25	....	....	....

TABLE 7. Continued.

Area.	Aggregate.	White.	Native.	Both par. nat.	Both par. for.	Both par. un.	F.-N. M.-F.	M.-N. F.-F.	F.-N. M.-Un.	M.-N. F.-Un.	F.-N. M.-Un.	M.-F. F.-Un.	Both par. X.	For.	Un.	Col.	Negro.	Ind.	Chi.	Jap.
Mahanoy City,	235	235	161	46	89	6	4	9	4	.....	2	1	....	71	3	.....	.....	....	....	....
Meadville,	216	211	161	102	25	15	5	6	6	1	.....	1	....	49	1	5	5	....	....	....
Mt. Carmel,	251	250	195	70	91	4	7	16	1	1	3	2	....	54	1	1	1	....	....	....
Nanticoke,	226	226	153	17	116	2	5	12	.....	.....	1	.....	....	73	.....	.....	.....	....	....	....
New Castle,	563	553	429	227	120	27	13	26	9	3	3	1	....	123	1	10	10	....	....	....
Norristown,	628	603	461	266	93	44	18	21	11	3	4	1	....	124	18	25	25	....	....	....
Oil City,	172	165	130	68	24	14	7	6	5	6	.....	.....	....	32	3	7	6	....	1	....
Philadelphia,	27,476	25,182	17,254	8,174	5,525	1,704	549	897	119	169	71	46	....	7,542	386	2,294	2,263	7	18	6
Phoenixville,	196	189	135	77	42	5	4	5	1	1	.....	.....	....	53	1	7	7	....	....	....
Pittsburg,	7,378	6,772	4,447	1,635	1,947	125	184	361	68	65	45	17	....	2,235	90	606	601	....	4	1
Pittston,	267	266	170	47	95	3	6	15	.....	1	3	.....	....	95	1	1	1	....	....	....
Plymouth,	249	249	154	53	74	1	4	17	2	.....	3	.....	....	94	1	.....	.....	....	....	....
Pottstown,	249	242	212	168	24	7	3	5	4	1	.....	.....	....	30	.....	7	7	....	....	....
Pottsville,	364	362	257	158	60	13	6	10	5	1	4	.....	....	104	1	2	2	....	....	....
Reading,	1,427	1,410	1,255	1,017	140	19	10	37	24	3	5	.....	....	150	5	17	17	....	....	....
Scranton,	1,926	1,917	1,242	460	582	19	38	102	24	8	7	2	....	673	2	9	9	....	....	....
Shamokin,	249	248	204	137	41	5	4	11	3	1	2	.....	....	42	2	1	1	....	....	....
Sharon,	300	296	204	107	71	8	3	7	5	1	2	.....	....	90	2	4	4	....	....	....
Shenandoah,	462	462	319	60	229	2	7	17	2	1	.....	1	....	142	1	.....	.....	....	....	....
South Bethlehem,	292	290	215	96	100	12	.....	2	2	.....	1	2	....	73	2	2	2	....	....	....
Steelton,	264	228	174	95	64	4	2	4	3	1	1	.....	....	51	3	36	36	....	....	....
Sunbury,	153	152	138	104	4	16	.....	6	3	5	.....	.....	....	6	8	1	.....	....	1	....
Titusville,	124	123	86	44	17	9	2	8	4	.....	2	.....	....	37	.....	1	1	....	....	....
Warren,	109	109	70	41	9	6	1	8	3	1	1	.....	....	36	3	.....	.....	....	....	....
West Chester,	248	171	132	94	9	9	3	8	5	2	2	.....	....	33	6	77	77	....	....	....
Wilkes-Barre,	1,049	1,034	674	269	287	14	26	48	15	5	7	3	....	351	9	15	15	....	....	....
Wilkinsburg,	230	223	172	115	20	13	9	10	3	1	1	.....	....	49	2	7	6	....	1	....
Williamsport,	568	544	450	283	45	58	11	20	17	13	2	1	....	74	20	24	24	....	....	....
York,	645	617	562	467	27	22	6	16	18	5	1	.....	....	51	4	28	28	....	....	....

Total rural,	56,982	55,692	45,536	28,688	9,262	2,648	815	1,850	1,228	667	314	64	....	9,394	762	1,290	1,286	3	1	....
Adams,	440	431	407	324	8	42	.....	4	18	9	1	1	....	13	11	9	9	....	....	....
Allegheny,	5,519	5,284	3,699	1,568	1,401	176	131	258	77	40	38	10	....	1,475	110	235	235	....	....	....
Armstrong,	811	802	691	476	103	35	19	22	20	8	6	2	....	103	8	9	9	....	....	....
Beaver,	920	892	676	382	144	56	12	38	23	13	6	2	....	173	43	28	28	....	....	....
Bedford,	551	541	511	405	10	42	4	11	18	18	1	2	....	22	8	10	10	....	....	....
Berks,	1,220	1,215	1,166	1,039	26	53	6	13	18	9	2	.....	....	46	3	5	5	....	....	....
Blair,	787	779	691	543	48	43	8	20	15	9	5	.....	....	72	16	8	7	....	1	....
Bradford,	848	844	761	553	39	73	14	28	21	28	5	.....	....	75	8	4	4	....	....	....
Bucks,	1,129	1,088	943	752	69	44	13	27	23	13	1	1	....	124	21	41	41	....	....	....
Butler,	613	611	502	304	87	29	10	33	20	11	7	1	....	98	11	2	2	....	....	....
Cambria,	1,382	1,380	1,064	486	430	28	24	50	15	14	15	2	....	302	14	2	2	....	....	....
Cameron,	124	123	97	63	11	7	.....	8	2	4	2	.....	....	22	4	1	1	....	....	....
Carbon,	767	767	586	326	197	20	8	23	8	2	2	.....	....	174	7	.....	.....	.....	.....	.....
Centre,	563	554	501	387	40	23	8	11	18	11	2	1	....	44	9	9	9	....	....	....
Chester,	1,304	1,128	997	742	98	59	17	27	31	17	5	1	....	117	14	176	176	....	....	....
Clarion,	444	442	395	288	29	34	6	18	10	9	1	.....	....	44	3	2	2	....	....	....
Clearfield,	965	958	758	415	208	37	15	49	14	13	6	1	....	190	10	7	7	....	....	....
Clinton,	397	394	338	244	32	32	6	8	11	3	2	.....	....	45	11	3	3	....	....	....
Columbia,	593	592	526	400	67	27	4	9	12	6	1	.....	....	65	1	1	1	....	....	....
Crawford,	624	621	557	380	31	63	7	20	27	18	9	2	....	55	9	3	3	....	....	....
Cumberland,	625	603	581	467	6	49	4	9	21	17	7	1	....	10	12	22	21	1	....	....
Dauphin,	855	828	755	599	50	30	8	28	26	10	4	.....	....	65	8	27	27	....	....	....
Delaware,	961	843	650	434	91	33	16	36	20	11	5	4	....	176	17	118	118	....	....	....
Elk,	446	445	329	162	100	27	9	22	3	6	.....	.....	....	112	4	1	1	....	....	....
Erie,	660	659	548	345	41	78	14	18	34	14	3	1	....	104	7	1	1	....	....	....
Fayette,	2,280	2,142	1,637	785	624	74	26	49	54	10	13	2	....	484	21	138	138	....	....	....
Forest,	83	83	72	47	5	7	2	2	6	1	1	1	....	11	.....	.....	.....	.....	.....	.....
Franklin,	691	675	660	548	6	44	5	5	28	20	3	1	....	8	7	16	16	....	....	....
Fulton,	129	128	127	106	2	11	.....	1	6	.....	1	.....	.....	.....	1	1	1	....	....	....
Greene,	367	362	356	286	10	25	2	7	17	9	.....	.....	....	4	2	5	5	....	....	....
Huntingdon,	478	472	442	374	16	13	5	9	18	6	1	.....	....	24	6	6	6	....	....	....
Indiana,	855	843	731	421	181	34	14	37	23	6	4	1	....	105	7	12	12	....	....	....
Jefferson,	790	788	631	346	149	52	13	28	19	16	8	.....	....	147	10	2	2	....	....	....
Juniata,	208	206	191	157	6	15	.....	4	7	1	1	.....	....	13	2	2	2	....	....	....
Lackawanna,	1,399	1,396	917	251	535	14	29	74	7	2	2	3	....	468	11	3	3	....	....	....
Lancaster,	1,415	1,398	1,295	1,131	34	41	11	29	28	12	7	2	....	85	18	17	17	....	....	....
Lawrence,	406	404	337	210	67	19	4	12	13	7	5	.....	....	61	6	2	2	....	....	....
Lebanon,	485	481	449	368	21	30	.....	3	23	3	1	.....	....	24	8	4	4	....	....	....
Lehigh,	1,095	1,092	919	725	140	10	10	25	7	2	.....	.....	....	163	10	3	3	....	....	....
Luzerne,	2,949	2,939	2,105	693	1,073	66	61	145	33	13	20	2	....	816	18	10	10	....	....	....

TABLE 7.—Continued.

Area.	Aggregate.	White.	Native.	Both par. nat.	Both par. for.	Both par. un.	F.-N. M.-F.	M.-N. F.-F.	F.-N. M.-Un.	M.-N. F.-Un.	F.-N. M.-Un.	M.-F. F.-Un.	Both par. X.	For.	Un.	Col.	Negro.	Ind.	Chi.	Jap.
Lycoming,	538	531	482	365	27	30	8	16	17	12	6	1	....	43	6	7	7	....	....	....
McKean,	422	420	306	165	50	46	7	16	13	6	3	.....	....	98	16	2	2	....	....	....
Mercer,	892	891	741	420	168	61	15	35	18	13	9	2	....	135	15	1	1	....	....	....
Mifflin,	429	425	400	319	15	31	3	9	15	6	2	.....	....	22	3	4	4	....	....	....
Monroe,	318	315	291	235	9	19	3	13	7	5	.....	.....	....	22	2	3	3	....	....	....
Montgomery,	1,636	1,559	1,302	916	221	53	30	47	24	8	2	1	....	239	18	77	72	....	....	....
Montour,	146	145	118	64	3	44	1	2	1	3	.....	.....	....	18	9	1	1	....	....	....
Northampton,	1,116	1,109	963	727	143	33	9	22	16	6	5	2	....	141	5	1	7	....	....	....
Northumberland,	757	757	647	460	115	22	4	25	12	4	5	.....	....	106	4	.....	.....	....	....	....
Perry,	322	321	312	246	10	18	2	9	17	10	.....	.....	....	4	5	1	1	....	....	....
Pike,	140	139	106	72	12	12	2	4	1	2	1	.....	....	33	.....	1	1	....	....	....
Potter,	370	369	314	189	29	43	5	16	17	11	3	1	....	45	10	1	.....	1	....	....
Schuylkill,	2,263	2,256	1,667	867	536	74	39	100	29	10	10	2	....	577	12	7	7	....	....	....
Snyder,	212	212	208	182	1	10	1	.....	9	4	1	.....	....	3	1	.....	.....	....	....	....
Somerset,	783	779	673	475	128	20	8	29	7	3	.....	.....	....	98	8	4	4	....	....	....
Sullivan,	148	148	125	84	19	5	4	6	4	3	.....	.....	....	22	1	.....	.....	....	....	....
Susquehanna,	581	580	483	315	87	33	9	13	18	7	1	.....	....	89	8	1	1	....	....	....
Tioga,	616	615	535	357	47	63	3	20	27	13	4	1	....	64	16	1	1	....	....	....
Union,	229	227	223	159	3	26	2	4	11	15	3	.....	....	3	1	2	2	....	....	....
Venango,	520	508	461	315	28	53	4	18	29	10	4	.....	....	38	9	12	12	....	....	....
Warren,	426	424	318	148	37	97	5	13	18	4	1	.....	....	97	9	2	1	1	....	....
Washington,	1,972	1,849	1,428	730	431	81	45	65	32	29	11	4	....	394	27	123	123	....	....	....
Wayne,	414	414	317	178	55	28	9	14	15	13	4	1	....	95	2	.....	.....	....	....	....
Westmoreland,	3,304	3,242	2,339	1,142	820	101	47	116	51	25	32	5	....	829	74	62	62	....	....	....
Wyoming,	213	213	199	158	6	10	.....	4	12	7	2	.....	....	10	4	.....	.....	....	....	....
York,	1,037	1,011	980	868	17	40	5	14	19	15	2	.....	....	30	1	26	26	....	....	....

BIRTHS.

175,804 births, exclusive of still births were registered during the year. This was an increase of 8,470 as compared with the previous year and an increase of births over deaths of 59,766 for the year 1907.

The birth rate per 1,000 of population increased from 24.1 in 1906, to 25.0 in 1907. This increase, both in the number of births and the birth rate, is more apparent than real and indicates an improved accuracy in the registration of births rather than an actual increase in the birth rate, for the reason that as noted in the report for 1906, the birth rate is still less than the rate which must necessarily exist in order to support the natural growth of our population.

Of the total number of births, 90,938 were males and 84,849 were females. The birth rate of the native population was 20.4 and of the foreign population 49.3. There were 1,759 plural births, of which number 1,786 were twin births and 9 triplet births. Of the twin births 1,153 occured to native mothers, 627 to foreign mothers, and in six of the plural births the nativity of mothers was unstated. Of the triplet births, six occurred to native mothers and three to foreign mothers.

There were 3,909 illegitimate births, a decrease of 2,190 compared with the previous year. The illegimate rate per 100,000 population was 55.5, the native rate being 57.0 and the foreign rate 42.1.

Table 1 shows the births by sex and months for the entire State, and for all incorporated municipalities over 5,000; also for certain groups of municipalities and for the rural sections of each county.

Table 2 shows the births for the same municipalities, sub-division by age and nativity of mothers.

Table 3 shows the births for the same municipalities, sub-division by nativity of mothers and the number of child of each class.

Table 4 shows the illegitimate births by localities and nativity of mothers.

Table 5 shows plural births (twins) by localities and nativity of mothers.

TABLE 1.

Births by sex and months for the entire State for incorporated municipalities over 5,000 population for certain groups of municipalities of less than 5,000 population and for the rural sections of each county (still-births excluded).

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Entire State,	To.,	175,804	14,811	13,540	15,198	14,227	14,007	13,698	15,129	15,671	15,115	14,609	14,519	15,280
	M.,	90,946	7,597	7,035	7,848	7,296	7,107	7,182	7,803	8,209	7,831	7,535	7,586	7,917
	F.,	84,858	7,214	6,505	7,350	6,931	6,900	6,516	7,326	7,462	7,284	7,074	6,933	7,363
Allegheny,	To.,	2,726	231	222	211	200	221	202	234	237	221	251	235	261
	M.,	1,380	117	102	106	106	110	99	115	121	116	112	123	153
	F.,	1,346	114	120	105	94	111	103	119	116	105	139	112	108
Allentown,	To.,	1,222	96	97	115	92	94	75	98	107	108	104	120	116
	M.,	638	47	55	60	58	50	28	47	64	51	55	67	56
	F.,	584	49	42	55	34	44	47	51	43	57	49	53	60
Altoona,	To.,	1,376	107	127	127	115	108	92	122	116	124	112	90	136
	M.,	720	51	59	61	63	60	47	64	63	68	63	50	71
	F.,	656	56	68	66	52	48	45	58	53	56	49	40	65
Archbald,	To.,	131	11	3	12	11	15	9	8	13	13	14	9	13
	M.,	79	4	3	7	6	8	5	5	7	9	9	7	9
	F.,	52	7	0	5	5	7	4	3	6	4	5	2	4
Ashland,	To.,	159	7	11	10	12	14	17	18	17	13	17	8	25
	M.,	70	2	5	2	7	5	5	9	5	4	10	4	12
	F.,	89	5	6	8	5	9	12	9	12	9	7	4	3
Bangor,	To.,	114	9	5	7	13	7	9	11	10	11	11	10	11
	M.,	67	5	4	3	8	4	6	7	7	5	8	4	6
	F.,	47	4	1	4	5	3	3	4	3	6	3	6	5
Beaver Falls,	To.,	260	21	22	24	19	20	22	25	23	19	20	23	22
	M.,	123	12	9	11	9	9	10	10	7	10	10	10	16
	F.,	137	9	13	13	10	11	12	15	16	9	10	13	6
Bethlehem,	To.,	296	29	15	34	27	28	29	25	24	25	24	18	18
	M.,	154	16	5	16	9	15	15	13	16	14	13	15	7
	F.,	142	13	10	18	18	13	14	12	8	11	11	3	11
Bloomsburg,	To.,	133	7	11	6	14	15	8	10	10	10	12	14	16
	M.,	63	1	5	2	9	9	3	5	6	4	9	2	8
	F.,	70	6	6	4	5	6	5	5	4	6	3	12	8

Braddock,	To.,	871	81	65	67	57	71	77	83	74	80	78	72	66
	M.,	468	49	33	36	26	35	55	34	36	52	40	37	35
	F.,	403	32	32	31	31	36	22	49	38	28	38	35	31
Bradford,	To.,	283	21	19	25	23	22	26	20	27	37	23	15	25
	M.,	140	11	11	12	7	9	17	11	12	19	10	8	13
	F.,	143	10	8	13	16	13	9	9	5	18	13	7	12
Bristol,	To.,	198	14	21	9	16	16	19	13	19	24	11	17	19
	M.,	101	6	10	3	6	10	8	8	14	12	6	8	10
	F.,	97	8	11	6	10	6	11	5	5	12	5	9	9
Butler,	To.,	601	68	47	42	48	50	56	47	48	38	41	53	63
	M.,	306	36	20	21	22	28	34	28	22	23	19	24	29
	F.,	295	32	27	21	26	22	22	19	26	15	22	29	34
Carbondale,	To.,	398	36	34	32	33	32	30	37	41	29	30	36	28
	M.,	209	19	19	15	15	17	20	17	23	17	19	17	11
	F.,	189	17	15	17	18	15	10	20	18	12	11	19	17
Carlisle,	To.,	168	13	14	13	5	13	13	16	18	13	23	15	12
	M.,	79	8	4	7	3	9	7	8	11	3	8	6	5
	F.,	89	5	10	6	2	4	6	8	7	10	15	9	7
Carnegie,	To.,	307	20	35	29	26	19	16	29	31	23	24	29	26
	M.,	157	12	16	7	19	8	6	9	16	11	15	13	15
	F.,	150	8	19	12	7	11	10	20	15	12	9	16	11
Chambersburg,	To.,	289	27	24	19	23	23	23	16	28	23	21	25	37
	M.,	153	11	12	9	15	8	14	8	18	15	10	13	20
	F.,	136	16	12	10	8	15	9	8	10	8	11	12	17
Charleroi,	To.,	203	14	21	15	11	12	13	19	24	20	14	23	17
	M.,	100	10	9	6	5	6	8	9	12	10	9	6	10
	F.,	103	4	12	9	6	6	5	10	12	10	5	17	7
Chester,	To.,	665	57	54	50	47	51	54	50	71	56	50	51	74
	M.,	354	28	31	31	27	27	28	22	41	33	21	22	43
	F.,	311	29	23	19	20	24	26	28	30	23	29	29	31
Clearfield,	To.,	157	12	11	11	12	18	15	17	11	16	11	6	17
	M.,	78	7	7	4	6	10	9	10	4	11	2	1	7
	F.,	79	5	4	7	6	8	6	7	7	5	9	5	10
Coatesville,	To.,	314	36	21	22	25	28	20	28	36	26	15	24	23
	M.,	165	19	9	9	14	13	11	16	23	13	17	9	12
	F.,	149	17	12	13	11	15	9	12	13	13	8	15	11
Columbia,	To.,	271	24	20	28	23	23	16	30	21	25	21	29	11
	M.,	148	10	9	19	16	13	6	17	10	16	12	15	5
	F.,	123	14	11	9	7	10	10	13	11	9	9	14	6
Connellsville,	To.,	279	25	23	28	25	25	16	31	25	13	21	22	25
	M.,	160	12	16	17	16	15	9	14	15	7	11	12	16
	F.,	119	13	7	11	9	10	7	17	10	6	10	10	9

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Conshohocken,	To.,	159	12	16	15	13	11	11	22	19	12	5	14	9
	M.,	85	8	10	7	8	5	6	13	12	5	3	7	1
	F.,	74	4	6	8	5	6	5	9	7	7	2	7	8
Corry,	To.,	92	7	14	9	10	11	5	6	3	8	5	8	6
	M.,	49	5	6	5	5	6	0	4	1	4	2	7	3
	F.,	43	2	8	3	5	5	5	2	2	4	3	1	3
Danville,	To.,	208	19	20	14	15	19	16	18	20	26	16	12	13
	M.,	116	4	10	7	8	10	10	13	10	17	11	9	7
	F.,	92	15	10	7	7	9	6	5	10	9	5	3	6
Dickson City,	To.,	164	15	11	15	7	5	11	12	15	27	21	10	15
	M.,	100	7	7	8	6	2	6	4	10	19	13	7	11
	F.,	64	8	4	7	1	3	5	8	5	8	8	3	4
DuBois,	To.,	369	26	28	36	46	27	22	31	36	20	29	40	28
	M.,	196	13	11	17	23	10	12	20	16	13	19	25	17
	F.,	173	13	17	19	23	17	10	11	20	7	10	15	11
Dunmore,	To.,	289	16	15	30	32	18	20	26	36	25	24	23	24
	M.,	156	8	7	16	14	11	13	18	18	15	13	11	12
	F.,	133	8	8	14	18	7	7	8	18	10	11	12	12
Duquesne,	To.,	547	48	51	36	34	40	35	37	60	62	40	54	50
	M.,	311	29	26	25	18	24	22	18	29	38	26	32	24
	F.,	236	19	25	11	16	16	13	19	31	24	14	22	26
Easton,	To.,	574	49	54	49	38	50	50	44	38	50	50	56	46
	M.,	289	24	31	23	21	33	30	16	16	22	25	29	19
	F.,	285	25	23	26	17	17	20	28	22	28	25	27	27
Edwardsville,	To.,	138	7	6	18	8	11	12	7	7	16	11	14	21
	M.,	74	6	4	11	6	6	9	3	1	9	4	7	8
	F.,	64	1	2	7	2	5	3	4	6	7	7	7	13
Erie,	To.,	1,571	107	119	154	122	124	107	140	150	146	132	128	142
	M.,	823	67	51	85	65	65	57	65	78	75	78	63	74
	F.,	748	40	68	69	57	59	50	75	72	71	54	65	68
Etna,	To.,	169	18	11	15	15	10	17	15	18	15	15	12	8
	M.,	114	13	11	11	9	4	11	10	13	9	11	6	6
	F.,	55	5	0	4	6	6	6	5	5	6	4	6	2

Forest City,	To.,	273	27	36	23	27	27	19	19	20	17	23	15	20
	M.,	159	15	21	10	17	17	10	13	10	9	15	9	13
	F.,	114	12	15	13	10	10	9	6	10	8	8	6	7
Franklin,	To.,	241	19	13	19	22	25	22	28	18	24	12	15	24
	M.,	127	13	6	11	10	14	7	16	6	16	8	4	16
	F.,	114	6	7	8	12	11	15	12	12	8	4	11	8
Freeland,	To.,	156	7	20	10	17	7	8	18	12	11	18	11	17
	M.,	74	2	9	6	9	3	5	7	7	5	11	4	6
	F.,	82	5	11	4	8	4	3	11	5	6	7	7	11
Greensburg,	To.,	303	23	26	28	20	24	22	26	33	21	26	32	22
	M.,	162	12	16	11	11	11	19	16	16	14	13	12	11
	F.,	141	11	10	17	9	13	3	10	17	7	13	20	11
Greenville,	To.,	145	6	15	12	12	10	12	10	8	15	14	19	12
	M.,	70	2	5	5	5	6	6	5	5	9	10	8	4
	F.,	75	4	10	7	7	4	6	5	3	6	4	11	8
Hanover,	To.,	191	12	20	14	21	13	12	19	20	17	13	14	16
	M.,	106	8	8	6	11	11	8	11	11	10	5	6	11
	F.,	85	4	12	8	10	2	4	8	9	7	8	8	5
Harrisburg,	To.,	1,307	108	96	107	124	98	115	105	113	110	100	114	117
	M.,	661	61	47	64	63	46	53	52	63	54	50	52	56
	F.,	646	47	49	43	61	52	62	53	50	56	50	62	61
Hazleton,	To.,	358	20	26	43	32	29	27	30	26	35	28	24	38
	M.,	175	11	9	21	15	12	16	19	14	18	15	12	13
	F.,	183	9	17	22	17	17	11	11	12	17	13	12	25
Homestead,	To.,	754	59	60	68	67	49	63	61	74	72	68	58	55
	M.,	373	31	26	36	35	25	29	31	30	33	37	35	25
	F.,	381	28	34	32	32	24	34	30	44	39	31	23	30
Huntingdon,	To.,	118	11	13	8	9	5	12	20	9	5	8	6	12
	M.,	49	4	4	2	3	2	5	7	5	2	5	5	5
	F.,	69	7	9	6	6	3	7	13	4	3	3	1	7
Indiana,	To.,	125	5	13	13	13	6	13	10	11	7	9	6	10
	M.,	68	3	7	10	4	4	7	7	8	3	3	1	11
	F.,	57	2	6	3	9	2	6	3	3	4	6	5	8
Jeannette,	To.,	234	20	18	22	24	17	19	16	26	13	14	20	25
	M.,	129	11	10	11	15	8	11	10	18	8	6	10	11
	F.,	105	9	8	11	9	9	8	6	8	5	8	10	14
Johnsonburg,	To.,	157	9	12	14	10	9	20	11	14	13	18	15	12
	M.,	81	4	7	9	7	5	12	8	5	6	7	8	3
	F.,	76	5	5	5	3	4	8	3	9	7	11	7	9
Johnstown,	To.,	1,264	98	72	100	97	103	103	108	126	127	116	113	100
	M.,	659	55	42	52	47	59	55	60	61	61	58	60	49
	F.,	604	43	30	48	50	44	48	48	65	66	58	53	51

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Kane,	To.,	226	21	21	22	19	16	8	20	21	13	23	17	25
	M.,	111	7	10	11	8	9	2	11	9	9	13	9	3
	F.,	115	14	11	11	11	7	6	9	12	4	10	8	12
Lancaster,	To.,	842	67	57	77	68	81	65	75	67	80	69	61	75
	M.,	432	28	30	37	37	40	39	42	32	35	37	32	43
	F.,	410	39	27	40	31	41	26	33	35	45	32	29	32
Lansford,	To.,	219	11	15	26	16	16	25	17	20	17	14	26	16
	M.,	100	8	8	12	7	7	11	9	11	3	7	13	4
	F.,	119	3	7	14	9	9	14	8	9	14	7	13	12
Latrobe,	To.,	277	23	22	15	28	24	22	31	21	27	23	15	26
	M.,	135	10	12	9	13	14	12	15	6	8	11	8	17
	F.,	142	13	10	6	15	10	10	16	15	19	12	7	9
Lebanon,	To.,	373	29	34	37	27	30	33	32	28	29	30	28	35
	M.,	182	17	15	19	15	16	21	14	13	12	13	12	15
	F.,	191	12	19	18	12	14	12	18	15	17	17	16	20
Lehighton,	To.,	120	10	9	9	12	11	9	12	10	8	7	9	14
	M.,	61	6	4	4	4	4	8	8	3	5	6	3	6
	F.,	59	4	5	5	8	7	1	4	7	3	1	6	8
Lewistown,	To.,	274	25	20	36	14	24	23	23	18	25	25	18	23
	M.,	126	13	10	15	8	9	10	11	5	11	13	11	10
	F.,	148	12	10	21	6	15	13	12	13	14	12	7	13
Lock Haven,	To.,	180	11	10	20	22	15	16	25	15	12	11	11	12
	M.,	89	6	4	9	14	5	9	13	5	5	6	7	6
	F.,	91	5	6	11	8	10	7	12	10	7	5	4	6
McKeesport,	To.,	1,460	127	113	130	95	114	121	129	123	129	117	118	144
	M.,	740	69	56	70	51	54	65	60	70	64	53	58	70
	F.,	720	58	57	60	44	60	56	69	53	65	64	60	74
McKees Rocks,	To.,	297	27	23	26	20	25	20	22	27	19	25	28	35
	M.,	159	15	12	14	12	12	11	10	13	8	15	17	20
	F.,	138	12	11	12	8	13	9	12	14	11	10	11	15
Mahanoy City,	To.,	394	47	24	39	42	29	36	35	34	25	28	35	20
	M.,	225	33	12	20	25	19	26	12	22	10	18	18	10
	F.,	169	14	12	19	17	10	10	23	12	15	10	17	10

Meadville,	To.,	241	25	26	17	26	17	22	18	31	19	16	12	12
	M.,	118	11	11	9	15	11	10	11	11	12	7	6	4
	F.,	123	14	15	8	11	6	12	7	20	7	9	6	8
Middletown,	To.,	133	11	14	10	6	10	11	10	8	12	18	10	13
	M.,	63	4	6	8	2	3	5	5	1	7	8	4	10
	F.,	70	7	8	2	4	7	6	5	7	5	10	6	3
Millvale,	To.,	224	21	19	24	11	10	17	15	21	14	33	22	17
	M.,	126	11	13	11	3	6	9	12	12	3	18	15	13
	F.,	98	10	6	13	8	4	8	3	9	11	15	7	4
Milton,	To.,	165	12	10	17	13	15	9	12	12	16	15	13	21
	M.,	84	8	6	11	6	8	5	5	4	9	6	4	12
	F.,	81	4	4	6	7	7	4	7	6	7	9	9	9
Minersville,	To.,	239	22	16	20	17	16	17	24	13	26	21	22	25
	M.,	133	14	7	8	7	12	12	16	8	12	12	13	12
	F.,	106	8	9	12	10	4	5	8	5	14	9	9	13
Monongahela,	To.,	202	17	17	16	18	14	20	17	20	17	16	16	14
	M.,	100	9	12	6	10	5	9	7	13	8	7	10	4
	F.,	102	8	5	10	8	9	11	10	7	9	9	6	10
Mount Carmel,	To.,	398	38	24	39	40	33	39	40	26	33	32	24	30
	M.,	218	20	13	22	21	17	31	24	11	17	14	12	16
	F.,	180	18	11	17	19	16	8	16	15	16	18	12	14
Mount Pleasant,	To.,	181	12	6	18	24	19	12	14	11	21	15	14	15
	M.,	89	9	5	5	11	8	8	5	5	9	8	6	10
	F.,	92	3	1	13	13	11	4	9	6	12	7	8	5
Nanticoke,	To.,	591	64	54	54	46	48	39	46	51	54	45	43	47
	M.,	298	30	26	20	23	29	24	24	29	25	18	25	25
	F.,	293	34	28	34	23	19	15	22	22	29	27	18	22
New Brighton,	To.,	192	15	8	14	12	18	15	17	18	19	10	23	23
	M.,	108	9	4	7	8	13	8	6	11	10	5	11	16
	F.,	84	6	4	7	4	5	7	11	7	9	5	12	7
New Castle,	To.,	907	64	55	85	53	74	83	83	83	89	79	76	78
	M.,	477	31	27	50	31	32	42	43	43	48	43	42	45
	F.,	430	33	28	35	27	42	41	40	40	41	36	34	33
Norristown,	To.,	428	28	37	35	29	38	34	32	38	43	41	41	29
	M.,	234	17	15	22	11	22	19	20	19	21	19	29	20
	F.,	194	11	22	13	18	16	15	12	19	22	22	12	9
North Braddock,	To.,	508	46	35	50	44	48	45	43	34	34	43	42	44
	M.,	277	19	13	30	27	26	29	27	22	19	25	17	23
	F.,	231	27	22	20	17	22	16	16	12	15	18	25	21
Oil City,	To.,	318	24	27	35	39	26	26	20	24	27	22	17	31
	M.,	162	13	18	19	17	8	12	10	17	15	8	7	18
	F.,	156	11	9	16	22	18	14	10	7	12	14	10	13

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Old Forge,	To.,	401	26	33	32	30	25	30	34	44	36	39	39	33
	M.,	214	11	19	17	15	19	18	20	20	13	24	20	18
	F.,	187	15	14	15	15	6	12	14	24	23	15	19	15
Olyphant,	To.,	168	11	11	8	15	12	17	20	19	15	12	12	16
	M.,	101	8	9	4	4	7	13	14	11	10	4	9	8
	F.,	67	3	2	4	11	5	4	6	8	5	8	3	8
Philadelphia,	To.,	33,907	2,989	2,617	2,844	2,636	2,493	2,684	3,015	3,205	2,862	2,849	2,828	2,885
	M.,	17,259	1,338	1,391	1,486	1,292	1,295	1,388	1,515	1,671	1,461	1,460	1,450	1,512
	F.,	16,648	1,651	1,226	1,358	1,344	1,198	1,296	1,500	1,534	1,401	1,389	1,378	1,373
Phoenixville,	To.,	306	22	14	23	21	26	24	29	31	32	27	26	31
	M.,	181	13	7	16	12	16	12	16	22	19	18	15	15
	F.,	125	9	7	7	9	10	12	13	9	13	9	11	16
Pittsburg,	To.,	8,700	752	635	717	630	673	630	664	820	786	739	768	886
	M.,	4,546	397	341	362	322	347	317	361	436	409	373	414	467
	F.,	4,154	355	294	355	308	326	313	303	384	377	366	354	419
Pittston,	To.,	468	40	28	50	46	39	40	36	41	31	31	44	42
	M.,	238	16	17	29	24	19	17	22	19	12	16	25	22
	F.,	230	24	11	21	22	20	23	14	22	19	15	19	20
Plymouth,	To.,	353	46	25	27	26	21	34	36	18	30	29	27	34
	M.,	169	24	9	8	16	14	14	14	8	13	16	13	20
	F.,	184	22	16	19	10	7	20	22	10	17	13	14	14
Pottstown,	To.,	298	25	25	21	18	26	18	30	25	36	25	20	29
	M.,	157	13	13	8	10	18	10	15	12	6	15	12	15
	F.,	141	12	12	13	8	8	8	15	13	30	10	8	14
Pottsville,	To.,	427	32	28	38	21	34	33	47	42	30	40	43	39
	M.,	207	8	11	22	9	18	22	18	24	18	23	21	13
	F.,	220	24	17	16	12	16	11	29	18	12	17	22	26
Punxsutawney,	To.,	205	14	16	13	18	14	17	19	16	25	12	24	17
	M.,	98	9	5	8	7	8	9	7	7	10	6	13	9
	F.,	107	5	11	5	11	6	8	12	9	15	6	11	8
Reading,	To.,	2,278	208	182	199	177	169	177	194	183	213	201	191	184
	M.,	1,150	104	104	97	86	92	86	107	93	111	87	89	94
	F.,	1,128	104	78	102	91	77	91	87	90	102	114	102	90

Rochester,	To.,	150	18	15	20	9	9	7	8	16	11	9	13	15
	M.,	74	8	3	14	3	3	3	3	9	7	4	9	8
	F.,	76	10	12	6	6	6	4	5	7	4	5	4	7
Saint Clair,	To.,	161	14	9	19	10	7	11	13	14	13	18	19	14
	M.,	86	6	4	11	6	6	3	5	6	8	11	11	9
	F.,	75	8	5	8	4	1	7	8	8	5	7	8	5
Saint Mary's,	To.,	224	19	15	15	13	22	21	24	19	13	25	21	17
	M.,	113	13	9	8	6	9	12	13	9	4	13	8	9
	F.,	111	6	6	7	7	13	9	11	10	9	12	13	8
Sayre,	To.,	144	13	11	17	15	12	14	13	13	3	14	10	9
	M.,	70	6	5	10	6	5	7	5	7	2	8	7	2
	F.,	74	7	6	7	9	7	7	8	6	1	6	3	7
Scottdale,	To.,	145	11	8	11	18	12	5	15	16	12	17	6	14
	M.,	73	5	7	3	15	4	3	10	5	7	9	3	2
	F.,	72	6	1	8	3	8	2	5	11	5	8	3	12
Scranton,	To.,	2,081	192	156	148	174	170	175	177	189	169	163	187	181
	M.,	1,053	96	73	75	97	88	86	98	98	81	76	95	90
	F.,	1,028	96	83	73	77	82	89	79	91	88	87	92	91
Shamokin,	To.,	500	40	38	37	44	41	34	44	53	48	45	38	38
	M.,	279	25	17	20	22	15	19	30	30	29	30	21	21
	F.,	221	15	21	17	22	26	15	14	23	19	15	17	17
Sharon,	To.,	370	33	29	25	36	27	30	27	34	39	30	34	36
	M.,	194	21	16	16	18	14	18	12	17	16	15	17	14
	F.,	176	12	13	9	18	13	12	15	17	23	15	17	22
Sharpsburg,	To.,	159	18	7	14	8	14	11	17	11	23	19	15	2
	M.,	89	9	6	8	4	7	6	8	4	15	13	9	.....
	F.,	70	9	1	6	4	7	5	9	7	8	6	6	2
Shenandoah,	To.,	421	24	29	26	25	43	41	39	39	45	37	28	45
	M.,	215	12	10	13	12	26	26	23	20	23	20	11	19
	F.,	206	12	19	13	13	17	15	16	19	22	17	17	26
South Bethlehem, Northampton county,	To.,	722	60	55	56	60	52	56	50	62	64	69	63	75
	M.,	361	30	30	28	23	28	23	29	25	37	37	40	31
	F.,	361	30	25	28	37	24	33	21	37	27	32	23	44
Steelton,	To.,	485	37	39	46	36	34	42	41	40	38	31	50	51
	M.,	249	16	19	18	21	21	27	20	19	20	11	31	25
	F.,	236	21	20	28	15	13	15	21	21	18	20	19	26
Sugar Notch,	To.,	63	5	1	5	5	2	2	6	4	8	8	9	8
	M.,	36	2	1	3	1	1	1	3	2	4	7	5	6
	F.,	27	3	0	2	4	1	1	3	2	4	1	4	2
Sunbury,	To.,	322	22	27	34	26	29	32	29	26	24	18	27	23
	M.,	168	13	17	12	17	12	16	16	16	15	11	12	11
	F.,	154	9	10	22	9	17	16	13	10	9	7	15	17

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Tamaqua,	To.,	263	32	22	31	16	22	18	15	20	24	22	23	18
	M.,	147	19	19	16	8	14	9	6	12	14	11	12	7
	F.,	116	13	3	15	8	8	9	9	8	10	11	11	11
Tarentum,	To.,	224	20	14	15	23	24	21	21	22	17	15	14	18
	M.,	117	11	9	11	13	15	11	6	12	7	8	7	7
	F.,	107	9	5	4	10	9	10	15	10	10	7	7	11
Titusville,	To.,	162	14	9	13	17	11	18	13	13	21	13	6	14
	M.,	82	9	2	7	9	4	9	5	7	13	6	4	7
	F.,	80	5	7	6	8	7	9	8	6	8	7	2	7
Tyrone,	To.,	216	21	11	17	14	25	13	19	24	19	21	16	16
	M.,	121	13	8	11	9	12	8	14	12	10	6	8	10
	F.,	95	8	3	6	5	13	5	5	12	9	15	8	6
Uniontown, Fayette county,	To.,	305	26	27	29	26	23	18	29	33	22	24	23	25
	M.,	161	16	11	16	13	15	8	16	18	11	11	10	16
	F.,	144	10	16	13	13	8	10	13	15	11	13	13	9
Warren,	To.,	243	19	15	19	16	19	15	18	26	25	27	27	17
	M.,	122	10	8	11	11	7	10	8	10	14	13	12	8
	F.,	121	9	7	8	5	12	5	10	16	11	14	15	9
Washington,	To.,	342	32	22	34	31	27	25	28	26	29	25	31	32
	M.,	185	21	12	18	21	8	16	15	12	16	16	13	17
	F.,	157	11	10	16	10	19	9	13	14	13	9	18	15
Waynesboro,	To.,	199	19	15	21	14	14	15	18	18	15	16	14	20
	M.,	98	9	8	10	5	8	7	8	11	8	7	4	13
	F.,	101	10	7	11	9	6	8	10	7	7	9	10	7
West Chester,	To.,	230	18	15	20	23	18	11	24	18	16	20	20	27
	M.,	116	9	7	7	9	9	6	10	10	8	14	10	17
	F.,	114	9	8	13	14	9	5	14	8	8	6	10	10
West Pittston,	To.,	120	7	8	13	8	11	10	15	4	14	14	6	10
	M.,	54	1	2	9	5	4	3	8	1	9	6	1	5
	F.,	66	6	6	4	3	7	7	7	3	5	8	5	5
Wilkes-Barre,	To.,	1,460	126	113	102	104	118	131	100	153	116	133	122	142
	M.,	773	63	58	62	50	64	71	54	80	61	76	66	68
	F.,	687	63	55	40	54	54	60	46	73	55	57	56	74

Wilkinsburg,	To.,	535	41	50	46	42	41	52	36	51	48	53	34	41
	M.,	285	22	21	24	24	22	30	16	32	24	29	20	21
	F.,	250	19	29	22	18	19	22	20	19	24	24	14	20
Williamsport,	To.,	612	59	54	60	38	55	62	49	51	50	38	45	51
	M.,	309	25	27	33	18	30	32	21	31	21	24	26	21
	F.,	303	34	27	27	20	25	30	28	20	29	14	19	30
Wilmerding,	To.,	218	22	18	24	9	18	24	20	15	19	13	16	20
	M.,	98	13	10	10	3	4	10	8	8	11	3	7	11
	F.,	120	9	8	14	6	14	14	12	7	8	10	9	9
Windber,	To.,	250	15	16	31	24	22	23	20	21	17	14	25	22
	M.,	146	8	14	19	9	14	16	8	13	9	8	15	13
	F.,	104	7	2	12	15	8	7	12	8	8	6	10	9
York,	To.,	1,031	91	78	79	80	78	81	100	90	80	76	105	93
	M.,	549	51	42	41	40	43	41	50	49	49	47	53	43
	F.,	482	40	36	38	40	35	40	50	41	31	29	52	50
Total cities and boroughs between 2,500 and 5,000 population.	To.,	8,151	730	610	757	622	673	654	711	732	681	643	655	683
	M.,	4,050	399	307	367	313	334	320	344	353	303	344	327	339
	F.,	4,101	331	303	390	309	339	334	367	379	378	299	328	344
Total cities and boroughs less than 2,500 population,	F.,	21,172	1,536	1,588	1,794	1,745	1,970	1,644	1,850	1,789	1,782	1,806	1,775	1,393
	M.,	11,076	916	852	935	878	840	845	969	1,004	1,010	872	978	977
	F.,	10,096	620	736	859	867	1,130	799	881	785	772	934	797	916
Total cities and boroughs over 5,000 population,	To.,	90,537	7,744	6,943	7,678	7,060	6,975	7,119	7,790	8,282	7,804	7,582	7,577	7,983
	M.,	46,725	3,829	3,594	3,997	3,588	3,641	3,749	3,989	4,319	4,031	3,918	3,919	4,151
	F.,	43,812	3,915	3,349	3,681	3,472	3,334	3,370	3,801	3,963	3,773	3,664	3,658	3,832
Total, rural,	To.,	55,944	4,801	4,399	4,969	4,800	4,389	4,281	4,778	4,868	4,848	4,578	4,512	4,721
	M.,	29,095	2,453	2,282	2,549	2,517	2,292	2,268	2,501	2,533	2,487	2,402	2,362	2,439
	F.,	26,849	2,348	2,117	2,420	2,283	2,097	2,013	2,277	2,335	2,361	2,176	2,150	2,282
Adams county,	To.,	555	58	41	56	46	48	42	51	43	49	44	42	35
	M.,	283	26	17	28	19	30	23	26	22	21	26	26	19
	F.,	272	32	24	28	27	18	19	25	21	28	18	16	16
Allegheny county,	To.,	3,492	310	256	301	299	256	256	307	312	299	302	282	312
	M.,	1,806	155	137	150	165	132	140	159	152	156	150	140	170
	F.,	1,686	155	119	151	134	124	116	148	160	143	152	142	142
Armstrong county,	To.,	982	91	63	90	78	60	84	70	87	91	98	82	88
	M.,	505	52	33	42	42	33	51	34	42	40	54	41	41
	F.,	477	39	30	48	36	27	33	36	45	51	44	41	47
Beaver county,	To.,	462	57	35	42	44	35	19	42	40	32	46	35	35
	M.,	241	34	17	22	23	18	9	12	20	18	25	22	21
	F.,	221	23	18	20	21	17	10	30	20	14	21	13	14
Bedford county,	To.,	682	55	63	59	56	37	63	58	50	52	72	54	63
	M.,	358	30	30	29	34	19	33	33	24	28	38	28	32
	F.,	324	25	33	30	22	18	30	25	26	24	34	26	31

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Berks county,	To.,	1,639	149	144	167	139	127	135	137	127	151	110	113	140
	M.,	821	74	75	86	77	62	61	76	60	72	55	59	64
	F.,	818	75	69	81	62	65	74	61	67	79	55	54	76
Blair county,	To.,	681	63	51	63	50	60	51	61	50	58	54	66	54
	M.,	367	36	25	37	26	31	23	35	23	32	34	38	27
	F.,	314	27	26	26	24	29	28	26	27	26	20	28	27
Bradford county,	To.,	660	54	42	54	50	62	45	54	47	70	61	53	68
	M.,	345	26	21	28	27	35	26	24	22	39	35	27	35
	F.,	315	28	21	26	23	27	19	30	25	31	26	26	33
Bucks county,	To.,	825	71	53	74	78	71	60	66	90	72	55	68	67
	M.,	431	35	25	45	45	32	35	31	45	36	29	40	33
	F.,	394	36	28	29	33	39	25	35	45	36	26	28	34
Butler county,	To.,	892	81	74	81	75	56	78	80	65	78	60	89	75
	M.,	437	38	38	39	38	27	36	34	31	41	31	48	36
	F.,	455	43	36	42	37	29	42	46	34	37	29	41	39
Cambria county,	To.,	1,628	142	128	133	135	134	115	138	150	119	139	137	158
	M.,	830	72	54	75	68	66	66	73	76	57	76	71	76
	F.,	798	70	74	58	67	68	49	65	74	62	63	66	82
Cameron county,	To.,	102	8	11	9	7	13	7	9	6	6	7	17	2
	M.,	48	3	5	4	2	3	3	5	2	4	5	11	1
	F.,	54	5	6	5	5	10	4	4	4	2	2	6	1
Carbon county,	To.,	568	39	42	54	60	46	49	45	48	57	32	42	54
	M.,	290	18	16	23	32	29	26	23	24	27	16	24	32
	F.,	278	21	26	31	28	17	23	22	24	30	16	18	22
Centre county,	To.,	786	66	61	75	70	76	53	68	68	78	56	56	59
	M.,	412	32	28	42	35	38	27	35	39	47	27	31	31
	F.,	374	34	33	33	35	38	26	33	29	31	29	25	28
Chester county,	To.,	1,101	114	85	79	83	85	87	96	104	88	86	96	98
	M.,	573	66	43	40	44	50	46	47	56	50	42	39	50
	F.,	528	48	42	39	39	35	41	49	48	38	44	57	48
Clarion county,	To.,	641	60	58	69	46	48	50	43	49	51	52	50	65
	M.,	320	26	26	35	19	25	22	26	24	29	24	26	38
	F.,	321	34	32	34	27	23	28	17	25	22	28	24	27

Clearfield county,	To.,	1,661	151	145	145	150	145	132	153	124	159	122	105	130
	M.,	907	95	83	72	78	68	67	89	72	85	63	54	71
	F.,	754	56	62	73	72	77	65	64	52	74	59	51	59
Clinton county,	To.,	287	21	25	16	21	19	18	24	28	31	30	22	32
	M.,	133	10	14	8	11	8	7	13	17	10	13	10	12
	F.,	154	11	11	8	10	11	11	11	11	21	17	12	20
Columbia county,	To.,	541	54	43	56	49	48	36	57	39	38	41	45	35
	M.,	285	28	26	30	30	30	20	30	17	17	21	17	19
	F.,	256	26	17	26	19	18	16	27	22	21	20	28	16
Crawford county,	To.,	555	46	31	62	55	44	35	52	51	45	40	40	54
	M.,	301	28	15	26	26	22	17	32	30	26	26	22	32
	F.,	254	18	16	36	29	22	18	20	21	20	14	18	22
Cumberland county,	To.,	539	37	39	41	40	42	43	49	45	57	54	43	48
	M.,	269	13	16	18	19	19	21	26	27	23	28	25	24
	F.,	270	24	23	23	21	23	22	23	18	24	26	18	25
Dauphin county,	To.,	893	76	73	74	66	61	75	81	77	82	70	70	88
	M.,	465	40	46	38	33	36	39	44	35	40	36	38	40
	F.,	428	36	27	36	33	25	36	37	42	42	34	32	48
Delaware county,	To.,	630	42	58	54	52	27	51	55	58	59	65	58	51
	M.,	345	18	37	28	35	15	29	28	31	33	33	33	25
	F.,	285	24	21	26	17	12	22	27	27	26	32	25	26
Elk county,	To.,	600	60	45	50	54	49	36	52	56	70	36	38	54
	M.,	343	34	22	29	30	27	23	23	31	44	23	22	35
	F.,	257	26	23	21	24	22	13	29	25	26	13	16	19
Erie county,	To.,	460	29	45	31	50	38	44	38	33	36	22	50	44
	M.,	250	20	29	15	28	13	26	18	19	21	13	23	25
	F.,	210	9	16	16	22	25	18	20	14	15	9	27	19
Fayette county,	To.,	2,424	192	206	221	204	189	172	235	223	188	210	164	220
	M.,	1,255	86	110	110	106	97	99	122	123	93	102	86	121
	F.,	1,169	106	96	111	98	92	73	113	100	95	108	78	99
Forest county,	To.,	220	16	12	27	26	23	13	28	14	14	17	17	13
	M.,	113	11	7	16	15	12	5	14	5	5	8	9	6
	F.,	107	5	5	11	11	11	8	14	9	9	9	8	7
Franklin county,	To.,	876	76	70	87	67	79	62	78	65	72	70	79	71
	M.,	479	41	33	41	38	40	37	41	36	37	49	44	42
	F.,	397	35	37	46	29	39	25	37	29	35	21	35	29
Fulton county,	To.,	242	19	15	20	23	21	17	26	31	13	28	12	17
	M.,	130	10	8	10	9	11	11	17	18	5	16	9	6
	F.,	112	9	7	10	14	10	6	9	13	8	12	3	11
Greene county,	To.,	463	44	32	31	48	29	36	34	39	49	50	34	37
	M.,	227	20	15	17	21	12	14	18	17	28	29	13	23
	F.,	236	24	17	14	27	17	22	16	22	21	21	21	14

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Huntingdon county,	To.,	469	45	39	49	31	25	38	31	51	48	40	40	32
	M.,	258	26	23	26	13	15	20	18	30	34	19	18	16
	F.,	211	19	16	23	18	10	18	13	21	14	21	22	16
Indiana county,	To.,	1,442	129	102	120	102	124	110	144	138	110	128	116	119
	M.,	748	65	57	70	55	71	56	63	68	45	69	70	59
	F.,	694	64	45	50	47	53	54	81	70	65	59	46	60
Jefferson county,	To.,	1,241	114	125	129	109	89	87	90	110	110	83	87	108
	M.,	643	59	75	65	58	43	47	48	57	52	42	44	53
	F.,	598	65	50	64	51	46	40	42	53	58	41	43	55
Juniata county,	To.,	285	16	24	29	25	24	28	19	32	23	25	21	19
	M.,	149	9	17	19	14	6	16	11	17	12	8	12	8
	F.,	136	7	7	10	11	18	12	8	15	11	17	9	11
Lackawanna county,	To.,	420	19	25	35	44	34	30	37	39	46	36	39	36
	M.,	230	13	13	18	24	17	18	22	16	30	19	19	21
	F.,	190	6	12	17	20	17	12	15	23	16	17	20	15
Lancaster county,	To.,	1,927	175	156	157	160	145	145	174	159	199	168	146	143
	M.,	1,006	81	78	83	88	79	81	90	80	101	92	77	76
	F.,	921	94	78	74	72	66	64	84	79	98	76	69	67
Lawrence county,	To.,	517	34	41	47	58	43	39	38	40	41	41	53	42
	M.,	258	13	23	21	24	28	18	15	20	17	24	32	23
	F.,	259	21	18	26	34	15	21	23	20	24	17	21	19
Lebanon county,	To.,	849	89	64	76	81	62	61	61	65	68	79	73	70
	M.,	416	47	32	40	36	34	31	36	30	33	33	30	34
	F.,	433	42	32	36	45	28	30	25	35	35	46	43	36
Lehigh county,	To.,	1,159	91	81	106	88	101	92	103	98	90	101	99	109
	M.,	599	42	45	55	41	56	53	55	49	49	48	48	58
	F.,	560	49	36	51	47	45	39	48	49	41	53	51	51
Luzerne county,	To.,	2,256	189	164	196	194	187	160	183	192	189	185	230	187
	M.,	1,231	106	88	116	104	100	95	102	102	103	97	126	92
	F.,	1,025	83	76	80	90	87	65	81	90	86	88	104	95
Lycoming county,	To.,	634	54	43	60	41	50	50	51	53	73	45	58	56
	M.,	331	27	24	26	23	33	22	24	31	38	23	27	33
	F.,	303	27	19	34	18	17	28	27	22	35	22	31	23

McKean county,	To.,	469	54	48	53	45	45	41	35	33	31	31	26	27
	M.,	255	31	21	28	25	30	16	21	19	17	13	16	18
	F.,	214	23	27	25	20	15	25	14	14	14	18	10	9
Mercer county,	To.,	504	33	52	44	40	36	38	34	49	52	41	46	39
	M.,	253	17	30	14	21	21	21	17	21	27	19	22	23
	F.,	251	16	22	30	19	15	17	17	28	25	22	24	16
Mifflin county,	To.,	565	59	37	42	39	45	42	51	56	47	49	47	51
	M.,	311	26	15	24	26	27	21	30	29	23	36	24	30
	F.,	254	33	22	18	13	18	21	21	27	24	13	23	21
Monroe county,	To.,	281	23	15	27	33	24	17	25	27	25	19	25	21
	M.,	140	10	10	12	21	14	6	11	13	12	8	12	11
	F.,	141	13	5	15	12	10	11	14	14	13	11	13	10
Montgomery county,	To.,	1,547	128	129	135	120	110	138	142	148	110	135	122	130
	M.,	819	70	73	76	67	67	79	71	81	65	63	55	60
	F.,	728	58	56	59	53	43	59	71	67	45	72	67	70
Montour county,	To.,	113	9	10	10	8	10	5	11	13	12	7	11	7
	M.,	51	5	4	4	1	3	2	7	9	5	4	3	4
	F.,	62	4	6	6	7	7	3	4	4	7	3	8	3
Northampton county,	To.,	953	76	76	71	96	85	74	71	95	93	86	70	60
	M.,	512	47	43	41	45	47	40	40	49	51	48	34	27
	F.,	441	29	33	30	51	38	34	31	46	42	38	36	33
Northumberland county,	To.,	1,089	92	86	104	106	64	92	103	88	94	70	93	97
	M.,	580	48	43	60	55	27	50	61	53	48	36	55	44
	F.,	509	44	43	44	51	37	42	42	35	46	34	38	53
Perry county,	To.,	364	40	44	34	41	21	34	10	22	39	26	26	27
	M.,	196	28	22	15	26	9	16	6	13	16	15	12	18
	F.,	168	12	22	19	15	12	18	4	9	23	11	14	9
Pike county,	To.,	100	6	11	15	5	11	11	3	7	8	11	8	4
	M.,	47	1	3	8	2	4	8	3	5	2	4	6	1
	F.,	53	5	8	7	3	7	3	0	2	6	7	2	3
Potter county,	To.,	334	28	35	30	35	26	27	31	25	24	23	22	28
	M.,	168	13	20	12	18	16	14	19	13	11	15	6	11
	F.,	166	15	15	18	17	10	13	12	12	13	8	16	17
Schuylkill county,	To.,	1,649	136	121	141	147	143	127	154	169	128	143	115	125
	M.,	842	59	63	70	63	73	75	79	88	61	76	58	77
	F.,	807	77	58	71	84	70	52	75	81	67	67	57	48
Snyder county,	To.,	355	28	22	40	29	27	26	24	38	38	34	17	32
	M.,	175	9	10	16	13	17	13	12	17	19	17	12	20
	F.,	180	19	12	24	16	10	13	12	21	19	17	5	12
Somerset county,	To.,	1,036	86	75	115	98	80	78	99	79	87	81	73	85
	M.,	527	36	38	58	50	33	39	56	49	42	40	42	44
	F.,	509	50	37	57	48	47	39	43	30	45	41	31	41

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Sullivan county,	To.,	233	25	18	23	19	25	19	23	17	23	11	12	18
	M.,	127	16	7	12	14	16	9	10	10	9	4	7	13
	F.,	106	9	11	11	5	9	10	13	7	14	7	5	5
Susquehanna county,	To.,	315	24	25	27	26	22	26	30	31	22	27	27	28
	M.,	158	11	10	15	15	9	14	13	13	13	14	19	12
	F.,	157	13	15	12	11	13	12	17	18	9	13	8	16
Tioga county,	To.,	679	46	54	60	61	63	55	52	61	66	56	57	48
	M.,	365	23	29	31	32	36	35	27	29	33	30	30	30
	F.,	314	23	25	29	29	27	20	25	32	33	26	27	18
Union county,	To.,	259	18	21	19	31	14	19	16	18	26	23	27	28
	M.,	136	7	12	7	16	6	8	9	11	13	15	14	13
	F.,	123	11	9	11	15	8	11	7	7	13	8	13	10
Venango county,	To.,	412	19	23	41	34	42	38	34	25	48	41	28	39
	M.,	194	11	11	20	19	16	15	14	10	22	25	16	15
	F.,	218	8	12	21	15	26	23	20	15	26	16	12	24
Warren county,	To.,	469	43	40	31	52	28	40	43	44	46	33	34	35
	M.,	229	27	16	12	21	15	16	20	28	24	18	13	19
	F.,	240	16	24	19	31	13	24	23	16	22	15	21	16
Washington county,	To.,	1,378	105	109	100	109	123	97	136	118	122	106	139	114
	M.,	735	58	52	59	70	57	49	71	67	80	52	64	56
	F.,	643	47	57	41	39	66	48	65	51	42	54	75	68
Wayne county,	To.,	373	34	22	36	40	28	31	33	51	25	31	28	24
	M.,	178	21	11	19	18	15	15	10	17	15	15	14	8
	F.,	195	13	11	17	22	13	16	23	34	10	16	14	16
Westmoreland county,	To.,	3,427	272	285	281	306	255	257	266	302	280	314	294	315
	M.,	1,778	128	151	133	153	131	139	147	165	139	170	171	151
	F.,	1,649	144	134	148	153	124	118	119	137	141	144	123	164
Wyoming county,	To.,	223	22	23	21	13	21	25	16	17	20	18	11	16
	M.,	123	14	17	9	12	13	13	6	6	8	10	6	9
	F.,	100	8	6	12	1	8	12	10	11	12	8	5	7
York county,	To.,	1,531	159	118	145	113	129	110	128	139	121	102	133	134
	M.,	759	72	54	72	59	68	56	69	78	55	54	72	60
	F.,	772	87	64	73	54	61	54	59	61	66	48	61	74

TABLE 2.

Births by nativity and ages of mothers for the entire State; for incorporated municipalities having more than 5,000 population; for certain groups of incorporated municipalities having less than 5,000 population and for the rural sections of each county, (still-births excluded).

		Total at all ages.	Under 15.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	Over 45.	Ages unstated.
Entire State,	Total,	175,804	82	14,477	49,930	46,173	33,088	21,074	7,546	854	2,580
	Native,	120,940	74	11,543	34,086	30,959	22,649	13 945	4,846	518	1,502
	Foreign,	54,175	7	2,891	14,917	15,084	10,352	7,064	2,658	326	876
	Nat. unstated,	689	1	43	127	130	87	6	24	10	202
Allegheny,	Total,	2,726	2	192	827	738	468	308	100	18	73
	Native,	1,483	2	141	468	403	256	139	24	6	44
	Foreign,	1,233	.....	51	357	332	210	169	76	12	26
	Nat. unstated,	10	.....	.....	2	3	2	.....	.....	.....	3
Allentown,	Total,	1,222	1	105	380	347	192	126	47	6	18
	Native,	844	1	81	242	243	141	89	37	2	8
	Foreign,	375	.....	24	138	103	51	36	10	4	9
	Nat. unstated,	3	.....	.....	.....	1	.....	1	.....	.....	1
Altoona,	Total,	1,376	1	111	427	401	239	139	51	6	1
	Native,	1,126	1	91	359	310	199	120	43	3	.....
	Foreign,	250	.....	20	68	91	40	19	8	3	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Archibald,	Total,	131	.....	7	34	31	28	24	6	.....	1
	Native,	84	.....	4	19	24	17	15	5	.....	.....
	Foreign,	47	.....	3	15	7	11	9	1	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ashland,	Total,	159	.....	11	31	44	38	27	8	.....	.....
	Native,	149	.....	11	30	42	36	25	5	.....	.....
	Foreign,	10	.....	.....	1	.....	2	2	3	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bangor,	Total,	114	.....	22	26	24	26	12	2	1	1
	Native,	97	.....	20	23	19	23	10	1	.....	1
	Foreign,	17	.....	2	2	5	3	2	1	1	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Beaver Falls,	Total,	260	.....	15	95	71	45	21	8	1	4
	Native,	163	.....	14	60	41	27	11	7	1	2
	Foreign,	95	.....	1	34	30	17	10	1	.....	2
	Nat. unstated,	2	.....	.....	1	.....	1	.....	.....	.....	.....

TABLE 2.—Continued.

		Total at all ages.	Under 15.	15-19.	20-24.	25-29	30-34.	35-39.	40-44.	Over 45.	Ages unstated.
Bethlehem,	Total,	296	.....	27	99	69	59	24	14	2	2
	Native,	266	.....	26	87	60	53	22	14	2	2
	Foreign,	29	.....	1	11	9	6	2	.....	.....	.....
	Nat. unstated,	1	.....	.....	1	.....	.....	.....	.....	.....	.....
Bloomsburg,	Total,	133	.....	10	43	39	20	14	6	1	.....
	Native,	126	.....	10	41	35	19	14	6	1	.....
	Foreign,	7	.....	.....	2	4	1	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Braddock,	Total,	871	.....	59	302	241	137	104	25	1	2
	Native,	235	.....	27	74	69	28	30	5	1	1
	Foreign,	634	.....	32	227	171	109	74	20	.....	1
	Nat. unstated,	2	.....	.....	1	1	.....	.....	.....	.....	.....
Bradford,	Total,	283	1	21	81	81	55	30	9	.....	5
	Native,	218	1	21	62	62	42	19	6	.....	5
	Foreign,	65	.....	.....	19	19	13	11	3	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bristol,	Total,	198	.....	13	57	43	37	24	8	.....	16
	Native,	142	.....	10	46	35	25	15	8	.....	3
	Foreign,	49	.....	3	9	6	10	9	.....	.....	12
	Nat. unstated,	7	.....	.....	2	2	2	.....	.....	.....	1
Butler,	Total,	601	1	45	185	177	118	58	12	4	1
	Native,	392	1	30	110	116	82	41	9	3	.....
	Foreign,	209	.....	15	75	61	36	17	3	1	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carbondale,	Total,	398	1	15	72	61	59	43	1	1	135
	Native,	332	1	12	63	46	54	37	5	.....	114
	Foreign,	59	.....	3	9	15	5	6	6	1	14
	Nat. unstated,	7	.....	.....	.....	.....	.....	.....	.....	.....	7
Carlisle,	Total,	168	.....	25	54	27	32	20	5	1	4
	Native,	162	.....	25	54	24	32	18	5	1	3
	Foreign,	6	.....	.....	.....	3	.....	2	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carnegie,	Total,	307	1	26	88	90	54	27	20	.....	1
	Native,	140	1	15	37	44	23	15	5	.....	.....
	Foreign,	167	.....	11	51	46	31	12	15	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Chambersburg,	Total,	289		29	94	69	49	31	11	2	4
	Native,	282		29	92	67	48	31	10	2	3
	Foreign,	7			2	2	1		1		1
	Nat. unstated,										
Charleroi,	Total,	203	1	12	66	58	34	23	8		1
	Native,	126		8	35	41	22	15	4		1
	Foreign,	77	1	4	31	17	12	8	4		
	Nat. unstated,										
Chester,	Total,	665		45	172	189	118	82	22	2	35
	Native,	488		39	128	139	91	55	17	2	17
	Foreign,	177		6	44	50	27	27	5		18
	Nat. unstated,										
Clearfield,	Total,	157		14	41	43	30	22	1	1	5
	Native,	146		13	38	38	30	21	1	1	4
	Foreign,	9			3	5		1			
	Nat. unstated,	2		1							1
Coatesville,	Total,	314		26	108	76	58	28	15	1	2
	Native,	248		23	81	62	45	24	12	1	
	Foreign,	65		3	27	14	13	4	3		1
	Nat. unstated,	1									1
Columbia,	Total,	271		21	71	67	48	34	23	2	5
	Native,	261		21	68	62	48	33	23	2	4
	Foreign,	10			3	5		1			1
	Nat. unstated,										
Connellsville,	Total,	279		21	89	64	64	30	10		1
	Native,	226		20	75	51	52	21	6		1
	Foreign,	53		1	14	13	12	9	4		
	Nat. unstated,										
Conshohocken,	Total,	159		7	44	38	32	30	4	3	1
	Native,	103		2	26	25	25	22	2	1	
	Foreign,	56		5	18	13	7	8	2	2	1
	Nat. unstated,										
Corry,	Total,	92		11	20	22	23	10	3	2	1
	Native,	80		11	18	14	23	10	1	2	1
	Foreign,	12			2	8			2		
	Nat. unstated,										
Danville,	Total,	208		15	68	46	39	32	5	3	
	Native,	196		15	67	41	36	29	5	3	
	Foreign,	11			1	4	3	3			
	Nat. unstated,	1				1					
Dickson City,	Total,	164		22	46	37	26	17	11	4	1
	Native,	43		5	13	11	9	4	1		
	Foreign,	121		17	33	26	17	13	10	4	1
	Nat. unstated,										

TABLE 2.—Continued.

		Total at all ages.	Under 15.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	Over 45.	Ages unstated.
DuBois,	Total,	369	.....	28	104	104	68	45	17	2	1
	Native,	269	.....	24	83	77	41	31	10	2	1
	Foreign,	100	.....	4	21	27	27	14	7	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunmore,	Total,	289	.....	17	64	79	64	41	14	1	9
	Native,	147	.....	11	35	42	34	18	7	.....	.....
	Foreign,	128	.....	5	29	36	28	23	6	1	.....
	Nat. unstated,	14	.....	1	.....	1	2	.....	1	.....	9
Duquesne,	Total,	547	.....	42	141	75	137	87	34	22	9
	Native,	169	.....	14	63	34	34	18	4	1	1
	Foreign,	375	.....	28	77	39	103	69	30	21	8
	Nat. unstated,	3	.....	.....	1	2	.....	.....	.....	.....	.....
Easton,	Total,	574	.....	61	172	150	114	53	18	2	4
	Native,	478	.....	53	140	126	98	40	16	1	4
	Foreign,	95	.....	8	32	24	15	13	2	1	.....
	Nat. unstated,	1	.....	.....	.....	.....	1	.....	.....	.....	.....
Edwardsville,	Total,	138	.....	8	41	32	17	14	5	2	19
	Native,	44	.....	3	17	8	3	3	2	.....	8
	Foreign,	87	.....	5	24	24	14	11	3	2	4
	Nat. unstated,	7	.....	.....	.....	.....	.....	.....	.....	.....	7
Erie,	Total,	1,571	1	124	432	406	302	220	59	10	17
	Native,	951	1	87	271	245	190	119	30	3	5
	Foreign,	616	.....	37	159	161	112	110	29	7	11
	Nat. unstated,	4	.....	.....	2	.....	.....	1	.....	.....	1
Etna,	Total,	169	.....	10	46	58	23	22	9	1	.....
	Native,	70	.....	1	18	27	14	8	1	1	.....
	Foreign,	99	.....	9	28	31	99	14	8	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Forest City,	Total,	273	.....	17	89	72	48	29	18	.....	.....
	Native,	44	.....	7	13	10	4	5	5	.....	.....
	Foreign,	229	.....	10	76	62	44	24	13	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Franklin,	Total,	241	.....	23	69	70	50	17	10	.....	2
	Native,	228	.....	23	65	63	48	17	10	.....	2
	Foreign,	13	.....	.....	4	7	2	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Freeland,	Total,	156		8	42	42	29	29	4	1	1
	Native,	100		6	23	26	18	22	3	1	1
	Foreign,	56		2	19	16	11	7	1		
	Nat. unstated,										
Greensburg,	Total,	303		26	86	89	55	32	13	2	
	Native,	224		23	61	66	39	25	9	1	
	Foreign,	79		3	25	23	16	7	4	1	
	Nat. unstated,										
Greenville,	Total,	145		11	48	40	22	15	6	2	1
	Native,	129		11	46	35	18	13	3	2	1
	Foreign,	16			2	5	4	2	3		
	Nat. unstated,										
Hanover,	Total,	191		20	63	43	37	19	7	1	1
	Native,	188		20	63	42	37	18	7	1	
	Foreign,	2				1					
	Nat. unstated,	1									
Harrisburg,	Total,	1,307	5	128	422	350	224	135	36	5	2
	Native,	1,185	5	123	389	306	202	121	33	4	2
	Foreign,	122		5	33	44	22	14	3	1	
	Nat. unstated,										
Hazleton,	Total,	358		19	85	101	82	50	16	1	4
	Native,	257		12	61	77	59	34	10		4
	Foreign,	101		7	24	24	23	16	6	1	
	Nat. unstated,										
Homestead,	Total,	754	1	66	239	223	140	59	23	2	1
	Native,	233		28	64	58	55	16	10	1	1
	Foreign,	520	1	38	175	165	84	43	13	1	
	Nat. unstated,	1					1				
Huntingdon,	Total,	118		18	40	29	23	8			
	Native,	115		18	39	27	23	8			
	Foreign,	3			1	2					
	Nat. unstated,										
Indiana,	Total,	125		9	34	33	26	18	4		1
	Native,	113		9	32	31	22	16	3		
	Foreign,	11			2	1	4	2	1		1
	Nat. unstated,	1				1					
Jeannette,	Total,	234	1	28	74	54	33	30	11	1	2
	Native,	170	1	22	55	40	23	20	6	1	2
	Foreign,	64		6	19	14	10	10	5		
	Nat. unstated,										
Johnsonburg,	Total,	157		11	35	44	31	26	7	1	2
	Native,	82		6	23	21	16	12	3		1
	Foreign,	74		5	11	23	15	14	4	1	1
	Nat. unstated,	1			1						

TABLE 2.—Continued.

		Total at all ages.	Under 15.	15-19.	20-24.	25-29	30-34.	35-39.	40-44.	Over 45.	Ages unstated.
Johnstown,	Total,	1,263		126	377	341	133	126	51	6	53
	Native,	832		81	251	227	121	88	24	3	37
	Foreign,	364		40	108	96	52	30	24	3	11
	Nat. unstated,	67		5	18	18	10	8	3		5
Kane,	Total,	226		17	74	52	49	24	6	2	2
	Native,	157		16	57	35	30	13	4	1	1
	Foreign,	69		1	17	17	19	11	2	1	1
	Nat. unstated,										
Lancaster,	Total,	842		71	231	233	171	106	25	2	3
	Native,	745		68	216	204	144	90	20	2	1
	Foreign,	95		3	14	29	27	16	5		1
	Nat. unstated,	2			1						
Lansford,	Total,	219		26	58	53	36	33	12	1	
	Native,	99		11	25	20	20	16	7		
	Foreign,	120		15	33	33	16	17	5	1	
	Nat. unstated,										
Latrobe,	Total,	277		16	84	77	56	26	14	1	3
	Native,	195		14	61	55	40	12	9	1	3
	Foreign,	82		2	23	22	16	14	5		
	Nat. unstated,										
Lebanon,	Total,	373		29	116	93	76	32	20	3	4
	Native,	342		24	106	89	68	32	17	3	3
	Foreign,	30		5	10	4	8		3		
	Nat. unstated,	1									1
Lehighton,	Total,	120		18	40	22	16	17	7		
	Native,	113		17	38	20	15	16	7		
	Foreign,	7		1	2	2	1	1			
	Nat. unstated,										
Lewistown,	Total,	274	1	35	87	67	48	29	6		1
	Native,	266	1	35	86	63	47	28	5		1
	Foreign,	8			1	4	1	1	1		
	Nat. unstated,										
Lock Haven,	Total,	180		21	53	38	29	23	9	1	6
	Native,	152		20	44	32	25	19	8		4
	Foreign,	27		1	9	6	4	4	1	1	1
	Nat. unstated,	1									1

McKeesport,	Total,	1,460		91	460	416	264	159	50	5	15
	Native,	623		47	175	179	137	58	21	2	4
	Foreign,	835		44	284	237	127	101	29	3	10
	Nat. unstated,	2			1						1
McKees Rocks,	Total,	297		18	108	79	53	19	9	1	5
	Native,	123		6	47	26	27	8	5	1	3
	Foreign,	172		12	61	53	31	11	4		
	Nat. unstated,	2									2
Mahanoy City,	Total,	394		16	100	90	89	63	19	3	14
	Native,	230		13	60	57	48	35	7	2	8
	Foreign,	160		3	39	33	39	27	12	1	6
	Nat. unstated,	4			1		2	1			
Meadville,	Total,	241		20	56	57	41	20	7	2	36
	Native,	196		17	50	50	39	20	6	2	12
	Foreign,	26		3	6	7	2		1		7
	Nat. unstated,	19									19
Middletown,	Total,	133		9	38	31	28	18	7	1	1
	Native,	111		8	32	22	26	15	7		1
	Foreign,	22		1	6	9	2	3		1	
	Nat. unstated,										
Millvale,	Total,	224		8	58	52	51	36	14	2	3
	Native,	154		8	53	42	35	12	4		
	Foreign,	67			5	8	16	24	10	2	2
	Nat. unstated,	3				2					1
Milton,	Total,	165		19	52	35	29	21	9		
	Native,	161		19	52	32	28	21	9		
	Foreign,	4				3	1				
	Nat. unstated,										
Minersville,	Total,	239		18	72	70	46	18	14		1
	Native,	96		5	30	19	20	12	5		1
	Foreign,	143		9	42	51	26	6	9		
	Nat. unstated,										
Monongahela,	Total,	202		15	61	51	37	23	15		
	Native,	135		14	44	36	20	12	9		
	Foreign,	67		1	17	15	17	11	6		
	Nat. unstated,										
Mount Carmel,	Total,	398		35	110	113	62	38	23	4	8
	Native,	256		25	67	76	43	22	18	3	2
	Foreign,	142		10	43	37	19	16	10	1	6
	Nat. unstated,										
Mount Pleasant,	Total,	181		15	44	61	36	17	5	2	1
	Native,	113		13	27	40	20	9	3	1	
	Foreign,	68		2	17	21	16	8	2	1	1
	Nat. unstated,										

TABLE 2.—Continued.

		Total at all ages.	Under 15.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	Over 45	Ages unstated.
Nanticoke,	Total,	591	.....	60	173	122	111	78	36	9	2
	Native,	191	.....	31	72	39	30	7	11	1	.....
	Foreign,	399	.....	29	100	83	81	71	25	8	2
	Nat. unstated,	1	.....	.....	1	.....	.....	.....	.....	.....	.....
New Brighton,	Total,	192	.....	29	50	50	33	20	6	1	3
	Native,	175	.....	19	46	50	31	20	5	1	3
	Foreign,	16	.....	9	4	.....	2	.....	1	.....	.....
	Nat. unstated,	1	.....	1	.....	.....	.....	.....	.....	.....	.....
New Castle,	Total,	907	3	78	282	259	162	95	27	.....	1
	Native,	618	2	56	198	165	114	64	18	.....	1
	Foreign,	289	1	22	84	94	48	31	9	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norristown,	Total,	428	.....	37	135	100	83	43	16	2	12
	Native,	345	.....	35	109	76	72	29	13	2	9
	Foreign,	81	.....	2	25	23	11	14	3	.....	3
	Nat. unstated,	2	.....	.....	1	1	.....	.....	.....	.....	.....
North Braddock,	Total,	508	.....	29	156	148	102	56	16	1	.....
	Native,	225	.....	18	71	72	33	26	4	1	.....
	Foreign,	283	.....	11	85	76	69	30	12	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oil City,	Total,	318	.....	19	86	77	71	36	18	2	9
	Native,	258	.....	18	71	59	61	34	10	1	4
	Foreign,	56	.....	1	15	18	9	2	8	1	2
	Nat. unstated,	4	.....	.....	.....	.....	1	.....	.....	.....	3
Old Forge,	Total,	401	.....	39	104	114	73	55	12	.....	4
	Native,	60	.....	9	18	18	8	6	1	.....	.....
	Foreign,	339	.....	30	86	95	65	48	11	.....	4
	Nat. unstated,	2	.....	.....	.....	1	.....	1	.....	.....	.....
Olyphant,	Total,	168	.....	14	39	51	27	26	11	.....	.....
	Native,	55	.....	5	13	16	7	10	4	.....	.....
	Foreign,	113	.....	9	26	35	20	16	7	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Philadelphia,	Total,	33,907	8	2,148	9,587	9,419	6,687	3,947	1,251	123	737
	Native,	18,812	8	1,600	5,672	5,172	6,525	1,866	556	46	367
	Foreign,	14,965	.....	541	3,880	4,218	3,143	2,070	689	76	348
	Nat. unstated,	130	.....	7	35	29	19	11	6	1	22

Phoenixville,	Total,	306		23	108	92	46	24	10	2	1
	Native,	144		15	44	46	24	8	5	1	1
	Foreign,	160		8	64	46	22	15	4	1	
	Nat. unstated,	2						1	1		
Pittsburg,	Total,	8,700	2	583	2,476	2,435	1,617	1,022	347	38	180
	Native,	4,764	2	394	1,385	1,306	918	498	145	14	102
	Foreign,	3,859		182	1,069	1,113	686	516	197	18	78
	Nat. unstated,	77		7	22	16	13	8	5	6	
Pittston,	Total,	468		33	123	118	100	67	16		11
	Native,	262		13	71	68	61	33	13		3
	Foreign,	202		19	51	50	38	33	3		8
	Nat. unstated,	4		1	1		1	1			
Plymouth,	Total,	353		31	94	87	76	50	7	1	7
	Native,	193		20	61	45	41	18	1		7
	Foreign,	160		11	33	42	35	32	6	1	
	Nat. unstated,										
Pottstown,	Total,	298		38	93	54	57	40	12	2	2
	Native,	245		37	77	42	48	32	7		2
	Foreign,	53		1	16	12	9	8	5	2	
	Nat. unstated,										
Pottsville,	Total,	427	1	17	122	100	100	64	18	4	1
	Native,	371	1	16	109	85	88	55	14	3	
	Foreign,	56		1	13	15	12	9	4	1	1
	Nat. unstated,										
Punxsutawney,	Total,	205		20	51	66	34	28	5		1
	Native,	166		17	41	51	28	25	3		1
	Foreign,	39		3	10	15	6	3	2		
	Nat. unstated,										
Reading,	Total,	2,278	1	233	739	580	387	245	78	9	6
	Native,	1,851	1	209	607	463	303	192	65	5	6
	Foreign,	427		24	132	117	84	53	13	4	
	Nat. unstated,										
Rochester,	Total,	150		14	49	48	21	16	1		1
	Native,	127		13	46	38	19	9	1		1
	Foreign,	22			3	10	2	7			
	Nat. unstated,	1		1							
Saint Clair,	Total,	161		11	35	37	38	29	8		3
	Native,	98		7	17	24	26	19	5		
	Foreign,	63		4	18	13	12	10	3		3
	Nat. unstated,										
Saint Marys,	Total,	224		11	51	77	44	25	16		
	Native,	185		11	45	61	37	20	11		
	Foreign,	39			6	16	7	5	5		
	Nat. unstated,										

TABLE 1.— Continued.

		Total at all ages.	Under 15.	15-19.	20-24.	25-29	30-34.	35-39.	40-44.	Over 45.	Ages unstated.
Sayre,	Total,	144	.....	13	48	33	27	16	7	.....	.....
	Native,	123	.....	9	36	30	26	15	7	.....	.....
	Foreign,	21	.....	4	12	3	1	1	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Scottdale,	Total,	145	.....	11	40	46	27	15	6	.....	.....
	Native,	132	.....	10	36	44	24	13	5	.....	.....
	Foreign,	13	.....	1	4	2	3	2	1	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Scranton,	Total,	2,081	.....	127	539	576	441	257	106	10	25
	Native,	1,231	.....	91	344	349	260	123	50	1	13
	Foreign,	845	.....	36	195	226	179	133	56	9	11
	Nat. unstated,	5	.....	.....	.....	1	2	1	.....	.....	1
Shamokin,	Total,	500	.....	38	144	133	88	62	23	3	9
	Native,	398	.....	32	122	105	69	43	15	3	9
	Foreign,	100	.....	5	22	28	19	18	8	.....	.....
	Nat. unstated,	2	.....	1	.....	.....	.....	1	.....	.....	.....
Sharon,	Total,	370	.....	25	121	104	63	33	15	3	6
	Native,	276	.....	19	95	76	45	25	10	3	3
	Foreign,	94	.....	6	26	28	18	8	5	.....	2
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Sharpsburg,	Total,	159	.....	10	46	40	26	25	9	1	2
	Native,	92	.....	2	28	26	13	15	6	.....	2
	Foreign,	67	.....	8	18	14	13	10	3	1	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Shenandoah,	Total,	421	.....	36	116	91	75	56	26	2	19
	Native,	230	.....	26	66	51	34	30	10	1	12
	Foreign,	191	.....	10	50	40	41	26	16	1	7
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bethlehem,	Total,	722	.....	62	239	187	137	69	24	3	1
	Native,	244	.....	24	51	66	60	27	15	1	.....
	Foreign,	475	.....	38	187	120	77	42	9	2	.....
	Nat. unstated,	3	.....	.....	1	1	.....	.....	.....	.....	1
Steelton,	Total,	485	.....	47	164	133	77	46	12	.....	6
	Native,	255	.....	31	94	60	34	24	7	.....	5
	Foreign,	229	.....	16	70	72	43	22	5	.....	1
	Nat. unstated,	1	.....	.....	.....	1	.....	.....	.....	.....	.....

Sugar Notch,	Total,	63		3	11	13	14	16	3		3
	Native,	29		1	5	7	6	9	1		
	Foreign,	33		2	6	6	8	7	2		2
	Nat. unstated,	1									1
Sunbury,	Total,	322		39	101	80	61	26	15		
	Native,	319		39	100	80	59	26	15		
	Foreign,	3			1		2				
	Nat. unstated,										
Tamaqua,	Total,	263		21	71	81	38	37	7	2	6
	Native,	241		18	64	77	36	33	7	2	4
	Foreign,	22		3	7	4	2	4			2
	Nat. unstated,										
Tarentum,	Total,	224		16	78	50	41	27	10	2	
	Native,	132		12	40	27	25	19	7	2	
	Foreign,	92		4	38	23	16	8	3		
	Nat. unstated,										
Titusville,	Total,	162		14	54	45	30	16	3		
	Native,	134		14	45	37	22	13	2		
	Foreign,	28			9	8	7	3	1		
	Nat. unstated,										
Tyrone,	Total,	216		24	74	49	41	23	4		1
	Native,	210		24	71	48	40	22	4		1
	Foreign,	6			3	1	1	1			
	Nat. unstated,										
Uniontown,	Total,	305		26	87	94	52	26	12	1	7
	Native,	252		24	69	77	43	22	10	1	6
	Foreign,	52		2	18	17	9	4	2		
	Nat. unstated,	1									1
Warren,	Total,	243		17	70	69	50	31	6		
	Native,	175		13	51	51	36	20	4		
	Foreign,	68		4	19	18	14	11	2		
	Nat. unstated,										
Washington,	Total,	342	2	40	92	85	65	50	7	1	
	Native,	299	2	38	85	75	51	43	5		
	Foreign,	42		1	7	10	14	7	2	1	
	Nat. unstated,	1		1							
Waynesboro,	Total,	199	1	20	56	52	35	26	8		1
	Native,	199	1	20	56	52	35	26	8		1
	Foreign,										
	Nat. unstated,										
West Chester,	Total,	230	1	19	61	58	48	25	16	1	1
	Native,	204	1	17	55	52	42	20	15	1	1
	Foreign,	25		1	6	6	6	5	1		
	Nat. unstated,	1		1							

TABLE 2.—Continued.

		Total at all ages.	Under 15.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	Over 45.	Ages unstated.
West Pittston,	Total,	120	.....	9	34	36	23	9	9	.....	.....
	Native,	70	.....	6	17	19	15	8	5	.....	.....
	Foreign,	50	.....	3	17	17	8	1	4	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wilkes-Barre,	Total,	1,460	.....	99	399	390	305	185	60	7	15
	Native,	928	.....	77	271	245	202	93	30	.....	10
	Foreign,	532	.....	22	128	145	103	92	30	7	5
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wilkinsburg,	Total,	535	.....	19	144	156	121	63	19	1	12
	Native,	460	.....	16	119	135	108	54	16	1	11
	Foreign,	75	.....	3	25	21	13	9	3	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Williamsport,	Total,	612	.....	60	169	168	124	58	24	2	7
	Native,	550	.....	59	156	152	110	48	20	1	4
	Foreign,	58	.....	1	13	15	13	9	4	1	2
	Nat. unstated,	4	.....	.....	.....	1	1	1	.....	.....	1
Wilmerding,	Total,	218	.....	10	79	70	33	20	3	1	2
	Native,	108	.....	4	37	34	22	8	2	.....	1
	Foreign,	110	.....	6	42	36	11	12	1	1	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Windber,	Total,	250	.....	23	81	74	45	23	3	1	.....
	Native,	133	.....	11	46	40	21	11	3	1	.....
	Foreign,	117	.....	12	35	34	24	12	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
York,	Total,	1,031	.....	89	350	265	176	107	42	2	.....
	Native,	994	.....	86	342	253	171	100	40	2	.....
	Foreign,	37	.....	3	8	12	5	7	2	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
All boroughs between 2,500 and 5,000 population,	Total,	8,151	5	561	2,862	1,958	1,412	902	329	40	82
	Native,	6,224	5	459	2,345	1,401	1,042	659	229	25	59
	Foreign,	1,913	.....	102	515	554	369	243	100	15	15
	Nat. unstated,	14	.....	.....	2	3	1	.....	.....	.....	8
All boroughs less than 2,500 population,	Total,	21,172	13	1,938	5,687	5,875	4,111	2,426	838	78	206
	Native,	15,447	9	1,546	4,025	4,264	3,049	1,769	592	59	134
	Foreign,	5,650	3	386	1,648	1,604	1,051	649	242	18	49
	Nat. unstated,	75	1	6	14	7	11	8	4	1	23

Counties (Rural).										
Adams,	Total,	555	.....	36	133	130	113	101	36	6	.....
	Native,	553	.....	36	132	130	113	101	35	6	.....
	Foreign,	1	.....	.....	.....	.....	.....	.....	1	.....	.....
	Nat. unstated,	1	.....	.....	1	.....	.....	.....	.....	.....	.....
Allegheny,	Total,	3,492	3	246	913	944	712	455	184	14	21
	Native,	2,051	3	176	542	520	417	271	103	9	10
	Foreign,	1,436	.....	70	370	423	294	182	81	5	10
	Nat. unstated,	5	.....	.....	1	1	1	1	.....	.....	1
Armstrong,	Total,	982	.....	95	246	236	208	137	46	7	7
	Native,	817	.....	86	204	179	178	116	40	7	7
	Foreign,	164	.....	8	42	57	30	21	6	.....	.....
	Nat. unstated,	1	.....	1	.....	.....	.....	.....	.....	.....	.....
Beaver,	Total,	462	.....	49	103	106	89	65	30	1	19
	Native,	374	.....	38	80	85	75	58	25	1	12
	Foreign,	86	.....	11	23	21	14	6	5	.....	6
	Nat. unstated,	2	.....	.....	.....	.....	.....	1	.....	.....	1
Bedford,	Total,	682	1	60	195	153	128	85	38	9	13
	Native,	647	1	57	185	147	125	79	35	7	11
	Foreign,	31	.....	3	9	6	3	5	3	2	.....
	Nat. unstated,	4	.....	.....	1	.....	.....	1	.....	.....	2
Berks,	Total,	1,639	2	178	483	364	297	191	71	13	40
	Native,	1,587	2	174	473	353	285	186	68	12	34
	Foreign,	44	.....	2	9	11	12	5	3	1	1
	Nat. unstated,	8	.....	2	1	.....	.....	.....	.....	.....	5
Blair,	Total,	681	1	76	189	157	115	92	43	2	6
	Native,	612	1	72	168	145	105	80	35	2	4
	Foreign,	68	.....	4	21	12	10	12	8	.....	1
	Nat. unstated,	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Bradford,	Total,	660	.....	68	182	148	141	84	29	2	6
	Native,	638	.....	68	175	141	134	83	29	2	6
	Foreign,	19	.....	.....	7	6	5	1	.....	.....	.....
	Nat. unstated,	3	.....	.....	.....	1	2	.....	.....	.....	.....
Bucks,	Total,	825	.....	71	178	179	200	137	52	4	4
	Native,	747	.....	69	170	157	171	123	49	4	4
	Foreign,	77	.....	2	8	22	29	13	3	.....	.....
	Nat. unstated,	1	.....	.....	.....	.....	.....	1	.....	.....	.....
Butler,	Total,	892	.....	61	252	245	169	110	38	9	8
	Native,	417	.....	47	189	192	144	96	35	8	6
	Foreign,	174	.....	14	63	53	25	14	3	1	1
	Nat. unstated,	1	.....	.....	.....	.....	.....	.....	.....	.....	1

TABLE 2.—Continued.

		Total at all ages.	Under 15.	15-19.	20-24.	25-29	30-34.	35-39.	40-44.	Over 45.	Ages unstated.
Cambria,	Total,	1,628	.....	175	428	418	288	219	73	16	11
	Native,	948	.....	117	251	235	149	130	48	9	9
	Foreign,	657	.....	56	172	179	133	83	25	7	2
	Nat. unstated,	23	.....	2	5	4	6	6	.....	.....	.....
Cameron,	Total,	102	.....	13	25	25	18	16	5	.....	.....
	Native,	86	.....	11	21	21	16	13	4	.....	.....
	Foreign,	16	.....	2	4	4	2	3	1	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carbon,	Total,	568	.....	65	171	131	96	63	33	2	7
	Native,	397	.....	49	123	78	72	44	27	.....	4
	Foreign,	169	.....	16	48	53	24	19	6	2	1
	Nat. unstated,	2	.....	.....	.....	.....	.....	.....	.....	.....	2
Centre,	Total,	786	.....	85	212	178	137	105	43	5	21
	Native,	682	.....	81	194	156	117	89	36	5	4
	Foreign,	101	.....	4	17	22	20	16	7	.....	15
	Nat. unstated,	3	.....	.....	1	.....	.....	.....	.....	.....	2
Chester,	Total,	1,101	1	113	258	256	227	175	58	7	6
	Native,	977	1	104	229	223	209	148	50	7	6
	Foreign,	121	.....	9	29	33	17	26	7	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	1	1	1	.....	.....
Clarion,	Total,	641	.....	68	146	158	123	95	44	2	5
	Native,	604	.....	66	140	149	114	89	40	2	4
	Foreign,	34	.....	2	6	8	8	6	4	.....	.....
	Nat. unstated,	3	.....	.....	.....	1	1	.....	.....	.....	1
Clearfield,	Total,	1,661	2	175	416	408	272	204	104	13	67
	Native,	984	2	143	275	242	148	109	54	6	5
	Foreign,	674	.....	32	141	165	124	95	50	7	60
	Nat. unstated,	3	.....	.....	.....	1	.....	.....	.....	.....	2
Clinton,	Total,	287	.....	28	64	71	58	46	10	1	9
	Native,	262	.....	26	61	63	51	43	10	1	7
	Foreign,	25	.....	2	3	8	7	3	.....	.....	2
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Columbia,	Total,	541	2	50	151	122	110	58	37	8	3
	Native,	503	2	47	144	116	103	51	33	7	.....
	Foreign,	38	.....	3	7	6	7	7	4	1	3
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Crawford,	Total,	555	2	45	145	129	105	78	35	3	13
	Native,	528	2	45	143	124	104	74	29	3	4
	Foreign,	17			2	5	1	3	6		
	Nat. unstated,	10						1			9
Cumberland,	Total,	539		47	150	129	99	77	24	7	5
	Native,	532		47	149	128	98	77	23	6	4
	Foreign,	4			1	1	1		1		
	Nat. unstated,	3								1	2
Dauphin,	Total,	893	1	90	234	227	172	105	50	8	6
	Native,	794	1	85	213	198	153	89	44	7	4
	Foreign,	98		5	21	29	19	16	6	1	1
	Nat. unstated,	1									1
Delaware,	Total,	630	1	41	130	164	148	104	32	5	5
	Native,	471	1	39	108	119	102	75	21	4	2
	Foreign,	159		2	22	45	46	29	11	1	3
	Nat. unstated,										
Elk,	Total,	600		63	155	153	119	84	44		2
	Native,	379		52	109	83	71	48	14		2
	Foreign,	220		11	46	70	48	16	29		
	Nat. unstated,	1							1		
Erie,	Total,	460		34	124	118	91	65	24	2	2
	Native,	414		33	119	107	83	52	18	2	
	Foreign,	42		1	5	10	7	13	6		
	Nat. unstated,	4				1	1				2
Fayette,	Total,	2,424		248	716	633	392	286	97	11	41
	Native,	1,510		178	443	372	260	179	61	6	11
	Foreign,	906		70	273	258	132	104	36	5	28
	Nat. unstated,	8				3		3			2
Forest,	Total,	220		21	65	57	37	32	6	1	1
	Native,	207		19	64	57	36	25	4	1	1
	Foreign,	12		2	1		1	6	2		
	Nat. unstated,	1						1			
Franklin,	Total,	876	1	102	217	209	171	114	52	4	6
	Native,	869	1	100	215	206	171	114	52	4	6
	Foreign,	6		1	2	3					
	Nat. unstated,	1		1							
Fulton,	Total,	242		21	60	63	37	38	13	2	8
	Native,	240		20	60	62	37	38	13	2	8
	Foreign,	2		1		1					
	Nat. unstated,										
Greene,	Total,	463		36	134	119	87	56	26	5	
	Native,	459		36	134	115	87	56	26	5	
	Foreign,	3				3					
	Nat. unstated,	1				1					

TABLE 2.—Continued.

		Total at all ages.	Under 15.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	Over 45.	Ages unstated.
Huntingdon,	Total,	469	.....	49	118	117	74	61	24	6	20
	Native,	437	.....	47	104	113	71	60	21	6	15
	Foreign,	26	.....	2	13	4	3	1	2	.....	1
	Nat. unstated,	6	.....	.....	1	.....	.....	.....	1	.....	4
Indiana,	Total,	1,442	1	131	418	373	266	168	65	6	14
	Native,	913	.....	91	259	215	174	114	43	5	12
	Foreign,	523	1	40	158	155	92	53	22	1	1
	Nat. unstated,	6	.....	.....	1	3	.....	1	.....	.....	1
Jefferson,	Total,	1,241	1	115	307	303	251	159	85	9	11
	Native,	788	1	82	211	184	147	100	49	6	8
	Foreign,	453	.....	33	96	119	104	59	36	3	3
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Juniata,	Total,	285	.....	23	61	76	64	39	18	3	1
	Native,	282	.....	22	61	75	63	39	18	3	1
	Foreign,	2	.....	.....	.....	1	1	.....	.....	.....	.....
	Nat. unstated,	1	.....	1	.....	.....	.....	.....	.....	.....	.....
Lackawanna,	Total,	420	1	34	118	104	76	47	19	1	20
	Native,	236	1	20	55	61	44	26	11	1	17
	Foreign,	183	.....	14	62	43	32	21	8	.....	3
	Nat. unstated,	1	.....	.....	1	.....	.....	.....	.....	.....	.....
Lancaster,	Total,	1,927	.....	141	479	530	347	295	112	15	8
	Native,	1,894	.....	139	469	524	341	290	109	15	7
	Foreign,	32	.....	2	10	6	6	5	3	.....	.....
	Nat. unstated,	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Lawrence,	Total,	517	.....	50	134	135	105	55	29	5	4
	Native,	351	.....	35	96	82	75	38	20	1	4
	Foreign,	166	.....	15	38	53	30	17	9	4	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lebanon,	Total,	849	1	114	254	188	143	106	28	6	9
	Native,	790	1	109	230	177	131	100	28	6	8
	Foreign,	58	.....	5	24	11	11	6	.....	.....	1
	Nat. unstated,	1	.....	.....	.....	.....	1	.....	.....	.....	.....
Lehigh,	Total,	1,159	.....	145	387	258	183	125	48	4	9
	Native,	888	.....	117	271	199	152	103	39	2	5
	Foreign,	267	.....	28	115	59	31	22	8	2	2
	Nat. unstated,	4	.....	.....	1	.....	.....	.....	1	.....	2

Luzerne,	Total,	2,256		189	657	538	416	302	121	12	21
	Native,	979		134	284	213	173	119	44	2	10
	Foreign,	1,274		55	373	324	243	183	77	10	9
	Nat. unstated,	3				1					2
Lycoming,	Total,	634		61	161	169	113	95	31	2	2
	Native,	585		57	154	147	108	87	28	2	2
	Foreign,	45		4	5	20	5	8	3		
	Nat. unstated,	4			2	2					
McKean,	Total,	469		48	127	110	84	67	26	6	1
	Native,	339		45	103	74	61	41	12	2	1
	Foreign,	129		3	24	36	23	25	14	4	
	Nat. unstated,	1						1			
Mercer,	Total,	504		38	107	132	101	83	28	6	9
	Native,	452		34	91	120	93	74	26	5	9
	Foreign,	51		4	15	12	8	9	2	1	
	Nat. unstated,	1			1						
Mifflin,	Total,	565	1	69	154	146	88	62	33	1	11
	Native,	540	1	67	149	133	83	62	33	1	11
	Foreign,	25		2	5	13	5				
	Nat. unstated,										
Monroe,	Total,	281	1	43	68	62	58	37	9		3
	Native,	275	1	43	67	61	54	37	9		3
	Foreign,	6			1	1	4				
	Nat. unstated,										
Montgomery,	Total,	1,547		107	372	416	315	241	84	7	5
	Native,	1,254		96	302	344	250	188	63	6	5
	Foreign,	292		11	70	72	65	52	21	1	
	Nat. unstated,	1						1			
Montour,	Total,	113		7	37	30	21	15	1	2	
	Native,	111		7	36	30	20	15	1	2	
	Foreign,	2			1		1				
	Nat. unstated,										
Northampton,	Total,	953		105	292	224	150	124	38	4	16
	Native,	788		96	232	184	125	105	32	3	11
	Foreign,	164		9	60	40	25	19	6	1	4
	Nat. unstated,	1									1
Northumberland,	Total,	1,089		102	286	288	201	125	60	5	22
	Native,	825		91	229	208	152	87	43	3	12
	Foreign,	256		11	56	78	47	37	17	2	8
	Nat. unstated,	8			1	2	2	1			2
Perry,	Total,	364		27	91	85	67	65	24	1	4
	Native,	357		27	91	83	64	64	23	1	4
	Foreign,	7				2	3	1	1		
	Nat. unstated,										

TABLE 2.—Continued.

		Total at all ages.	Under 15.	15-19.	20-24.	25-29	30-34.	35-39.	40-44.	Over 45.	Ages unstated.
Pike,	Total,	100		13	27	30	13	12	2	1	2
	Native,	84		12	23	26	9	11	1	1	1
	Foreign,	16		1	4	4	4	1	1		1
	Nat. unstated,										
Potter,	Total,	334	1	56	102	70	48	32	17	2	6
	Native,	299	1	54	91	62	44	26	14	2	5
	Foreign,	34		2	11	8	4	6	3		
	Nat. unstated,	1									1
Schuylkill,	Total,	1,649		170	457	399	284	216	99	9	15
	Native,	1,242		139	343	289	216	164	72	8	11
	Foreign,	406		31	114	110	68	52	27	1	3
	Nat. unstated,	1									1
Snyder,	Total,	355	2	50	111	64	58	50	18	1	1
	Native,	350	2	50	111	62	58	48	18	1	
	Foreign,	2						2			
	Nat. unstated,	3				2					1
Somerset,	Total,	1,036		102	341	243	177	102	55	11	5
	Native,	869		93	278	193	154	86	51	9	5
	Foreign,	163		9	62	49	23	15	4	1	
	Nat. unstated,	4			1	1		1		1	
Sullivan,	Total,	233		23	60	54	50	32	12	1	1
	Native,	206		23	52	48	47	25	9	1	1
	Foreign,	27			8	6	3	7	3		
	Nat. unstated,										
Susquehanna,	Total,	315		37	88	67	66	32	19	1	5
	Native,	296		33	88	64	59	30	19	1	2
	Foreign,	16		4		3	7	2			
	Nat. unstated,	3									3
Tioga,	Total,	679		75	183	166	122	77	43	3	10
	Native,	572		68	173	146	97	54	26	1	7
	Foreign,	105		7	10	19	25	23	17	2	2
	Nat. unstated,	2				1					1
Union,	Total,	259		33	70	56	40	36	19	3	2
	Native,	257		33	69	56	39	36	19	3	2
	Foreign,	2			1		1				
	Nat. unstated,										

Venango,	Total,	412		42	119	90	86	46	21	3	5
	Native,	398		41	115	87	85	45	20	2	3
	Foreign,	14		1	4	3	1	1	1	1	2
	Nat. unstated,										
Warren,	Total,	469		58	145	112	80	51	19	2	2
	Native,	375		49	119	90	62	39	12	2	2
	Foreign,	94		9	26	22	18	12	7		
	Nat. unstated,										
Washington,	Total,	1,378	1	139	386	344	258	185	46	6	13
	Native,	906	1	107	252	211	175	123	25	5	7
	Foreign,	470		32	134	132	83	62	20	1	6
	Nat. unstated,	2				1			1		
Wayne,	Total,	373		27	83	97	69	56	34	5	2
	Native,	324		26	77	85	55	47	29	4	1
	Foreign,	47		1	5	12	13	9	5	1	1
	Nat. unstated,	2			1		1				
Westmoreland,	Total,	3,427		303	998	904	617	402	146	22	35
	Native,	1,711		191	481	402	326	213	75	13	10
	Foreign,	1,699		109	514	496	288	189	71	9	23
	Nat. unstated,	17		3	3	6	3				2
Wyoming,	Total,	223		18	60	55	44	24	11	1	10
	Native,	210		18	58	51	39	23	10	1	10
	Foreign,	12			2	3	5	1	1		
	Nat. unstated,	1				1					
York,	Total,	1,531		184	406	340	283	215	86	5	12
	Native,	1,525		183	406	338	283	214	85	5	11
	Foreign,	5		1		2		1	1		
	Nat. unstated,	1									1
Total rural exclusive of all incorrated municipalities,	Total,	55,944	27	5,388	15,135	13,813	10,375	7,296	2,906	346	658
	Native,	43,287	26	4,600	11,743	10,342	8,057	5,669	2,198	266	386
	Foreign,	12,472	1	778	3,373	3,432	2,301	1,606	704	78	199
	Nat. unstated,	185		10	19	39	17	21	4	2	73
Total cities and boroughs over 5,000	Total,	90,537	37	6,590	26,245	24,528	17,190	10,450	3,473	390	1,634
	Native,	55,982	34	4,938	16,772	14,952	10,501	5,848	1,845	168	924
	Foreign,	34,140	3	1,625	9,381	9,491	6,631	4,566	1,612	215	613
	Nat. unstated,	415		27	92	82	58	36	16	7	97

TABLE 8.

Births by nativity of mothers and number of mothers for the entire State, for incorporated municipalities having more than 5,000 population, for certain groups of municipalities having less than 5,000 population and for the rural sections of each county (still-births excluded).

		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Entire State,	Total,	175,804	47,647	35,866	26,126	18,533	13,311	9,884	6,974	4,954	3,410	2,404	1,447
	Native,	120,940	35,338	25,736	17,855	12,410	8,561	6,202	4,393	3,087	2,158	1,464	918
	Foreign,	54,175	12,120	10,383	8,189	6,065	4,693	3,659	2,551	1,853	1,240	929	523
	Nat. unstated,	689	189	107	82	58	57	23	30	14	12	11	6
Allegheny,	Total,	2,726	894	573	364	224	150	102	73	52	43	34	12
	Native,	1,483	598	321	179	94	63	38	15	10	3	5	.....
	Foreign,	1,233	296	251	183	127	87	64	58	42	30	29	12
	Nat. unstated,	10	.....	1	2	3	.....	.....	.....	.....	.....	.....	.....
Allentown,	Total,	1,222	359	288	179	104	87	52	37	27	20	11	10
	Native,	844	247	200	113	74	56	34	23	21	17	6	7
	Foreign,	375	111	88	65	30	25	18	14	6	3	4	3
	Nat. unstated,	3	1	.....	1	.....	.....	.....	.....	.....	.....	1	.....
Altoona,	Total,	1,376	440	300	214	137	94	61	52	24	18	13	3
	Native,	1,126	373	245	170	110	77	50	36	20	15	10	3
	Foreign,	250	67	55	44	27	17	11	16	4	3	3	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Archbald,	Total,	131	29	31	21	15	7	12	5	5	1	2	1
	Native,	84	19	21	13	10	6	5	3	4	1	1	.....
	Foreign,	47	10	10	8	5	1	7	2	1	.....	1	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ashland,	Total,	159	42	33	19	13	10	19	6	3	6	3	2
	Native,	149	40	33	19	12	10	17	6	2	5	3	.....
	Foreign,	10	2	.....	.....	1	.....	2	.....	1	1	.....	2
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bangor,	Total,	114	38	17	21	12	9	7	1	3	2	1	.....
	Native,	97	34	16	18	10	6	5	1	3	1	1	.....
	Foreign,	17	4	1	3	2	3	2	.....	.....	1	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Beaver Falls,	Total,	260	89	61	34	23	18	9	7	5	1	1	1
	Native,	163	63	40	22	11	7	7	3	3	.....	.....	.....
	Foreign,	95	25	21	12	11	11	2	4	2	1	1	1
	Nat. unstated,	2	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....

Bethlehem,	Total,	296	100	66	42	31	18	7	12	5	6	2	1
	Native,	266	94	55	37	28	15	6	11	5	6	2	1
	Foreign,	29	6	10	5	3	3	1	1				
	Nat. unstated,	1		1									
Bloomsburg,	Total,	133	49	25	22	14	5	3	3	6	1	1	1
	Native,	126	46	23	20	14	5	3	3	6	1	1	1
	Foreign,	7	3	2	2								
	Nat. unstated,												
Braddock,	Total,	871	235	189	144	99	68	45	29	29	16	12	2
	Native,	235	85	53	36	23	13	11	5	3	3	2	
	Foreign,	634	150	135	108	75	55	34	24	26	13	10	2
	Nat. unstated,	2		1		1							
Bradford,	Total,	283	97	79	39	15	11	12	7	4	3	2	2
	Native,	218	78	61	31	12	9	6	4	4	3	1	
	Foreign,	65	19	18	8	3	2	6	3			1	2
	Nat. unstated,												
Bristol,	Total,	198	46	36	30	18	13	10	5	5	3	1	3
	Native,	142	37	31	23	13	10	5	4	5	3	1	2
	Foreign,	49	8	5	7	5	3	5	1				1
	Nat. unstated,	7	1										
Butler,	Total,	601	190	149	85	58	50	29	16	9	6	3	5
	Native,	392	127	92	56	36	35	18	13	6	5	1	2
	Foreign,	209	63	57	29	22	15	11	3	3	1	2	3
	Nat. unstated,												
Carbondale,	Total,	398	101	88	62	36	20	16	13	9	7	3	1
	Native,	332	90	77	52	27	13	13	11	9	3	2	
	Foreign,	59	9	11	8	9	5	3	2		4	1	1
	Nat. unstated,	7	2		2		2						
Carlisle,	Total,	168	67	39	14	18	9	4	2	4	3	2	
	Native,	162	67	36	13	18	8	4	2	4	3	1	
	Foreign,	5		3	1		1						
	Nat. unstated,	1										1	
Carnegie,	Total,	307	91	68	45	25	28	11	9	17	7	2	1
	Native,	140	48	32	26	8	9	2	3	7	4		
	Foreign,	167	43	36	19	17	19	9	6	10	3	2	1
	Nat. unstated,												
Chambersburg,	Total,	289	82	60	43	31	14	18	18	9		3	3
	Native,	282	79	59	42	31	14	17	18	8		3	3
	Foreign,	7	3	1	1			1		1			
	Nat. unstated,												
Charleroi,	Total,	203	59	37	38	25	10	9	10	7	1	1	3
	Native,	126	37	26	26	16	5	5	3	4			2
	Foreign,	77	22	11	12	9	5	4	7	3	1	1	1
	Nat. unstated,												

TABLE 3.—Continued.

		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Chester,	Total,	665	183	128	109	81	48	39	19	15	12	7	2
	Native,	488	135	100	81	58	35	24	15	9	10	2	2
	Foreign,	177	48	28	28	23	13	15	4	6	2	5	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Clearfield,	Total,	157	40	29	21	15	22	10	3	3	1	1	.....
	Native,	146	36	29	19	15	21	8	3	3	1	1	.....
	Foreign,	9	3	.....	2	.....	1	2	.....	.....	.....	.....	.....
	Nat. unstated,	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville,	Total,	314	92	81	59	38	12	9	5	6	3	4	1
	Native,	248	73	59	49	27	11	8	5	5	3	3	1
	Foreign,	65	18	22	10	11	1	1	.....	1	.....	1	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Columbia,	Total,	271	66	46	49	41	24	6	9	13	9	1	3
	Native,	261	63	42	47	41	24	6	9	12	9	1	3
	Foreign,	10	3	4	2	.....	.....	.....	.....	1	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Connellsville,	Total,	279	73	59	51	24	13	12	16	5	6	4	4
	Native,	226	67	49	41	16	12	8	12	5	4	4	1
	Foreign,	53	6	10	10	8	1	4	4	.....	2	.....	3
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Conshohocken,	Total,	159	40	31	26	11	12	10	6	7	3	4	2
	Native,	103	24	21	17	8	10	6	5	2	1	3	2
	Foreign,	56	16	10	9	3	2	4	1	5	2	1	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Corry,	Total,	92	31	16	16	12	4	4	5	.....	2	1	.....
	Native,	80	26	16	14	10	3	4	5	.....	1	1	.....
	Foreign,	12	5	.....	2	2	1	.....	.....	.....	1	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Danville,	Total,	208	48	47	36	20	15	13	9	7	5	2	3
	Native,	196	45	45	34	18	14	13	9	6	4	2	3
	Foreign,	11	2	2	2	2	1	.....	.....	1	1	.....	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dickson City,	Total,	164	41	24	30	19	13	7	11	5	5	4	1
	Native,	43	11	4	9	3	7	4	1	2	2	.....	.....
	Foreign,	121	30	20	21	16	6	3	10	3	3	4	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

DuBois,	Total,	369	88	77	50	41	35	21	24	14	7	4	3
	Native,	269	77	61	38	26	20	14	15	8	4	2	2
	Foreign,	100	11	16	12	15	15	7	9	6	3	2	1
	Nat. unstated,												
Dunmore,	Total,	289	59	64	31	20	33	26	16	10	13	5	4
	Native,	147	33	36	15	15	13	11	4	4	7	2	1
	Foreign,	128	16	25	15	4	20	14	12	6	6	3	3
	Nat. unstated,	14	7	3	1	1		1					
Duquesne,	Total,	547	146	107	92	65	40	38	19	11	5	4	3
	Native,	169	55	33	34	11	9	11	5	5	3		
	Foreign,	375	91	71	58	54	31	27	14	6	2	4	3
	Nat. unstated,	3		3									
Easton,	Total,	574	200	131	67	54	47	25	19	7	7	10	1
	Native,	478	171	104	58	47	41	18	14	4	7	9	
	Foreign,	95	29	27	9	6	6	7	5	3		1	1
	Nat. unstated,	1				1							
Edwardsville,	Total,	138	39	37	14	8	8	4	3	4	5	2	4
	Native,	44	17	13	4	2	1		2	1	1		1
	Foreign,	87	20	24	10	5	7	3		3	4	2	3
	Nat. unstated,	7	2			1		1	1				
Erie,	Total,	1,571	488	343	239	136	101	82	48	36	16	12	5
	Native,	951	349	227	129	79	49	32	19	13	5	7	2
	Foreign,	616	139	114	109	57	52	50	29	23	11	5	3
	Nat. unstated,	4		2	1								
Etna,	Total,	169	54	23	23	17	12	9	6	5	2	6	2
	Native,	70	28	10	6	11	1	3	3		1	2	1
	Foreign,	99	26	13	17	6	11	6	3	5	1	4	1
	Nat. unstated,												
Forest City,	Total,	273	56	50	44	36	23	19	12	9	11	6	
	Native,	44	18	8	5	5	3	1		2	1		
	Foreign,	229	38	42	39	31	20	18	12	7	10	6	
	Nat. unstated,												
Franklin,	Total,	241	85	64	31	22	12	7	7	3	1	3	2
	Native,	228	82	59	28	21	12	7	7	3	1	3	2
	Foreign,	13	3	5	3	1							
	Nat. unstated,												
Freeland,	Total,	156	32	29	21	21	11	8	7	7	6	4	4
	Native,	100	25	17	11	14	6	3	6	5	4	2	3
	Foreign,	56	7	12	10	7	5	5	1	2	2	2	1
	Nat. unstated,												
Greensburg,	Total,	302	78	68	52	30	25	11	11	8	7	3	2
	Native,	224	64	53	39	21	17	8	6	6	3	2	
	Foreign,	79	14	15	13	9	8	3	5	2	4	1	2
	Nat. unstated,												

TABLE 3.—Continued.

		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Greenville,	Total,	145	49	32	19	13	10	6	4	2	2	1	.....
	Native,	129	48	27	17	11	7	6	3	2	1	1	.....
	Foreign,	16	1	5	2	2	3	.....	1	.....	1	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hanover,	Total,	191	70	40	27	16	14	9	3	5	1	.....	3
	Native,	188	69	40	27	15	13	9	3	5	1	.....	3
	Foreign,	2	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harrisburg,	Total,	1,307	448	308	202	116	82	42	40	13	16	12	11
	Native,	1,185	417	292	184	100	66	37	29	11	13	10	10
	Foreign,	122	31	16	18	16	16	5	11	2	3	2	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hazleton,	Total,	358	85	72	49	40	25	25	14	11	6	12	4
	Native,	257	69	52	37	28	15	19	10	7	4	6	3
	Foreign,	101	16	20	12	12	10	6	4	4	2	6	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homestead,	Total,	754	197	175	108	101	64	35	21	21	13	8	3
	Native,	233	75	56	35	21	15	10	4	7	2	4	1
	Foreign,	520	122	119	73	79	49	25	17	14	11	4	2
	Nat. unstated,	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Huntingdon,	Total,	118	47	30	14	15	6	2	2	.....	1	.....	1
	Native,	115	46	28	14	15	6	2	2	.....	1	.....	1
	Foreign,	3	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indiana,	Total,	125	32	29	24	17	9	5	1	4	2	.....	.....
	Native,	113	29	28	22	16	7	4	1	3	2	.....	.....
	Foreign,	11	2	1	2	1	2	1	.....	1	.....	.....	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jeannette,	Total,	234	75	48	28	25	22	9	9	2	4	5	3
	Native,	174	58	36	20	21	17	4	4	.....	4	2	1
	Foreign,	64	17	12	8	4	5	5	5	2	.....	3	2
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Johnsonburg,	Total,	157	33	32	24	19	13	8	10	3	6	3	2
	Native,	82	23	17	12	10	3	3	5	1	4	1	1
	Foreign,	74	9	15	12	9	10	5	5	2	2	2	1
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Johnstown,	Total,	1,263	356	250	206	124	87	53	62	31	29	21	7
	Native,	832	237	172	145	74	55	29	41	25	18	11	2
	Foreign,	364	102	67	56	43	25	21	14	5	10	6	5
	Nat. unstated,	67	17	11	5	7	7	3	7	1	1	4	.....
Kane,	Total,	226	61	64	39	18	14	11	7	5	1	2	2
	Native,	157	50	46	30	10	9	4	2	2	1	1	.....
	Foreign,	69	11	18	9	8	5	7	5	3	.....	1	2
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lancaster,	Total,	842	249	184	126	93	63	30	24	21	20	9	4
	Native,	745	234	170	111	81	48	25	17	17	18	6	4
	Foreign,	95	15	14	14	12	14	5	7	4	2	3	.....
	Nat. unstated,	2	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....
Lansford,	Total,	219	51	43	36	24	15	15	13	5	5	4	4
	Native,	99	20	26	15	8	7	8	3	4	2	1	2
	Foreign,	120	31	17	21	16	8	7	10	1	3	3	2
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Latrobe,	Total,	277	72	51	42	23	38	16	8	8	6	7	1
	Native,	195	51	41	29	13	27	12	6	4	2	4	1
	Foreign,	82	21	10	13	10	11	4	2	4	4	3	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lebanon,	Total,	373	102	80	56	38	24	22	14	11	7	7	5
	Native,	342	94	72	54	35	22	18	13	10	6	6	5
	Foreign,	30	8	8	2	3	1	4	1	1	1	1	.....
	Nat. unstated,	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Lehighton,	Total,	120	32	25	19	15	8	7	5	4	2	2	.....
	Native,	113	32	23	17	14	8	6	5	3	2	2	.....
	Foreign,	7	.....	2	2	1	.....	1	.....	1	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lewistown,	Total,	274	76	61	41	36	17	15	11	5	2	2	3
	Native,	266	76	59	41	34	16	12	11	5	2	2	3
	Foreign,	8	.....	2	.....	2	1	3	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lock Haven,	Total,	180	61	40	23	18	10	7	5	6	4	.....	3
	Native,	152	53	32	21	14	10	5	5	4	3	.....	2
	Foreign,	27	7	8	2	4	.....	2	.....	2	1	.....	1
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
McKeesport,	Total,	1,460	372	305	256	172	113	74	56	41	25	14	10
	Native,	623	171	117	110	78	42	36	26	12	9	6	7
	Foreign,	835	199	188	146	94	71	38	30	29	16	8	3
	Nat. unstated,	2	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
McKees Rocks,	Total,	297	86	52	38	33	20	12	7	11	2	1	.....
	Native,	123	42	24	17	16	8	5	3	3	2	.....	.....
	Foreign,	172	44	28	20	17	11	7	4	8	.....	1	.....
	Nat. unstated,	2	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....

TABLE 3.—Continued.

		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Mahanoy City,	Total,	394	98	66	46	42	19	30	16	9	5	7	2
	Native,	230	64	46	28	24	10	21	9	6	4	3	1
	Foreign,	160	34	20	17	18	9	9	7	3	1	4	1
	Nat. unstated,	4	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Meadville,	Total,	241	80	69	38	16	14	8	6	3	2	1	.....
	Native,	196	66	57	30	15	11	7	4	2	2	1	.....
	Foreign,	26	7	8	6	1	2	.....	.....	1	.....	.....	.....
	Nat. unstated,	19	7	4	2	.....	1	1	2	.....	.....	.....	.....
Middletown,	Total,	133	27	24	13	19	11	14	9	7	3	2	1
	Native,	111	25	20	10	14	9	12	7	6	2	2	1
	Foreign,	22	2	4	3	5	2	2	2	1	1	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Millvale,	Total,	224	43	46	31	28	11	17	16	12	8	2	2
	Native,	154	36	43	23	21	6	8	3	4	5	1	2
	Foreign,	67	6	3	8	7	5	9	13	8	2	1	.....
	Nat. unstated,	3	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Milton,	Total,	165	60	33	25	10	9	8	5	5	2	2	2
	Native,	161	60	33	23	9	9	8	5	4	2	2	2
	Foreign,	4	.....	.....	2	1	.....	.....	.....	1	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Minersville,	Total,	239	49	53	39	19	19	22	12	6	10	1	1
	Native,	96	29	18	15	5	7	8	5	1	4	1	1
	Foreign,	143	20	35	24	14	12	14	7	5	6	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Monongahela,	Total,	202	52	39	32	32	15	7	10	1	3	3	1
	Native,	135	40	27	25	21	7	4	5	.....	1	2	.....
	Foreign,	67	12	12	7	11	8	3	5	1	2	1	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mount Carmel,	Total,	398	71	72	79	46	32	28	14	6	7	18	7
	Native,	256	50	52	51	29	21	17	10	2	2	10	4
	Foreign,	142	21	20	28	17	11	11	4	4	5	8	3
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mount Pleasant,	Total,	181	35	40	29	23	13	13	9	5	3	2	.....
	Native,	113	26	30	19	10	8	5	4	3	2	1	.....
	Foreign,	68	9	10	10	13	5	8	5	2	1	1	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Nanticoke,	Total,	591	124	110	85	61	52	42	36	18	21	14	8
	Native,	191	65	41	28	20	14	7	3	3	3	2	4
	Foreign,	399	59	68	57	41	38	36	33	15	18	12	4
	Nat. unstated,	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Brighton,	Total,	192	51	56	27	20	18	8	3	1	3	.....	1
	Native,	175	47	53	25	17	16	8	3	1	3	.....	1
	Foreign,	16	3	3	2	3	2	.....	.....	.....	.....	.....	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Castle,	Total,	907	273	226	170	88	51	31	26	16	10	4	3
	Native,	618	194	163	114	56	26	21	15	10	6	3	2
	Foreign,	289	79	63	56	30	25	10	11	6	4	1	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norristown,	Total,	428	131	101	54	41	30	16	16	12	8	4	2
	Native,	345	116	84	39	32	24	12	12	7	6	3	1
	Foreign,	81	15	16	15	9	5	4	4	5	2	1	1
	Nat. unstated,	2	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....
North Braddock,	Total,	508	120	107	97	55	42	24	25	15	8	6	4
	Native,	225	61	46	47	24	18	8	11	3	2	3	1
	Foreign,	283	59	61	50	31	24	16	14	12	6	3	3
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oil City,	Total,	318	88	63	61	37	19	15	9	2	7	2	1
	Native,	258	73	52	50	30	16	13	3	2	5	2	.....
	Foreign,	56	14	11	11	6	3	2	1	.....	2	.....	1
	Nat. unstated,	4	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Old Forge,	Total,	401	95	61	68	50	36	32	20	11	11	2	5
	Native,	60	16	11	11	7	9	1	2	1	1	.....	.....
	Foreign,	339	79	50	56	42	27	31	18	10	10	2	5
	Nat. unstated,	2	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....
Olyphant,	Total,	168	43	28	26	16	14	11	14	5	2	2	4
	Native,	55	17	12	7	4	2	1	6	2	.....	1	2
	Foreign,	113	26	16	19	12	12	10	8	3	2	1	2
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Philadelphia,	Total,	33,907	10,280	7,248	4,866	3,126	2,315	1,645	1,171	816	527	389	224
	Native,	18,812	6,623	4,305	2,647	1,605	1,064	743	506	361	226	161	108
	Foreign,	14,965	3,622	2,923	2,208	1,521	1,239	898	660	452	299	227	114
	Nat. unstated,	130	35	20	11	10	12	4	5	3	2	1	2
Phoenixville,	Total,	306	96	70	45	30	23	11	10	6	6	1	1
	Native,	144	47	31	27	12	7	5	4	4	2	.....	.....
	Foreign,	160	49	39	18	18	16	6	5	1	4	1	1
	Nat. unstated,	2	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....
Pittsburg,	Total,	8,700	2,606	1,782	1,221	792	602	372	323	200	142	97	60
	Native,	4,764	1,623	1,035	669	401	284	179	120	77	61	32	26
	Foreign,	3,859	960	735	544	384	314	186	200	122	81	64	34
	Nat. unstated,	77	23	12	8	7	4	7	3	1	.....	1	.....

TABLE 3.—Continued.

		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Pittston,	Total,	468	119	95	66	41	44	34	25	11	7	7	4
	Native,	262	64	59	43	22	19	16	14	4	4	4	4
	Foreign,	202	45	35	23	18	24	18	11	7	3	3	.....
	Nat. unstated,	4	1	1	.....	1	1	.....	.....	.....	.....	.....	.....
Plymouth,	Total,	353	94	62	56	47	29	17	11	13	8	1	5
	Native,	193	62	44	31	13	14	8	3	2	5	.....	2
	Foreign,	160	32	18	25	29	15	9	8	11	3	1	3
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pottstown,	Total,	298	98	61	38	26	19	13	17	7	7	2	1
	Native,	245	91	50	29	22	17	9	13	5	3	1	1
	Foreign,	53	7	11	9	4	2	4	4	2	4	1	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pottsville,	Total,	427	126	81	61	34	35	29	13	15	12	9	4
	Native,	371	114	73	52	28	32	22	12	14	8	6	4
	Foreign,	56	12	8	9	6	3	7	1	1	4	3	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Punxsutawney,	Total,	205	45	42	41	29	14	9	12	6	1	3	.....
	Native,	166	39	37	32	22	11	7	10	2	1	3	.....
	Foreign,	39	6	5	9	7	3	2	2	4	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Reading,	Total,	2,278	713	479	324	246	163	109	91	54	25	31	13
	Native,	1,851	609	397	265	198	121	78	69	40	19	24	8
	Foreign,	427	104	82	59	48	42	31	22	14	6	7	5
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rochester,	Total,	150	39	53	30	11	5	3	1	2	1	1	2
	Native,	127	34	47	26	9	4	2	.....	2	.....	.....	2
	Foreign,	22	4	6	4	2	1	1	1	.....	1	1	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Saint Clair,	Total,	161	44	28	25	19	11	8	12	6	5	3	.....
	Native,	98	24	19	15	12	6	4	9	5	2	2	.....
	Foreign,	63	20	9	10	7	5	4	3	1	3	1	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Saint Marys,	Total,	224	47	38	42	31	11	12	9	3	9	5	3
	Native,	185	44	34	35	24	8	9	7	8	6	5	2
	Foreign,	39	3	4	7	7	3	3	2	5	3	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Sayre,	Total,	144	58	34	20	11	8	6	1	1	2	1	1
	Native,	123	43	31	20	10	6	6	1	1	2	1	1
	Foreign,	21	15	3	.....	1	2	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Scottdale,	Total,	145	49	24	23	20	9	10	2	4	3	1	.....
	Native,	132	46	22	20	20	8	8	2	3	2	1	.....
	Foreign,	13	3	2	3	.....	1	2	.....	1	1	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Scranton,	Total,	2,081	543	393	286	222	153	107	90	76	55	52	21
	Native,	1,231	386	252	175	117	71	63	42	33	23	23	10
	Foreign,	845	157	140	110	105	81	44	48	43	31	29	11
	Nat. unstated,	5	.....	1	1	.....	1	.....	.....	.....	1	.....	.....
Shamokin,	Total,	500	121	107	76	47	42	32	21	15	14	10	8
	Native,	398	108	92	55	32	33	21	18	11	9	8	4
	Foreign,	100	12	15	20	15	9	11	3	4	5	2	4
	Nat. unstated,	2	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Sharon,	Total,	370	130	71	55	44	23	15	7	6	6	2	2
	Native,	276	109	50	41	34	10	9	6	3	5	1	2
	Foreign,	93	20	21	14	10	13	6	1	3	1	1	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sharpsburg,	Total,	159	38	23	29	18	18	12	5	5	2	5	.....
	Native,	92	28	17	14	8	5	8	3	3	1	4	.....
	Foreign,	67	10	6	15	10	13	4	2	2	1	1	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Shenandoah,	Total,	421	101	84	58	37	42	21	23	19	8	6	7
	Native,	230	57	59	32	12	18	14	8	9	5	2	5
	Foreign,	191	44	25	26	25	24	7	15	10	3	4	2
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bethlehem,	Total,	722	207	150	97	81	60	33	21	23	25	9	4
	Native,	244	65	46	33	29	18	7	13	8	13	5	2
	Foreign,	475	140	104	64	51	42	26	8	15	12	4	2
	Nat. unstated,	3	2	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Steelton,	Total,	485	138	122	70	56	29	25	16	8	7	4	5
	Native,	255	81	64	30	32	14	9	10	2	5	2	5
	Foreign,	229	56	58	40	24	15	16	6	6	2	2	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sugar Notch,	Total,	63	12	13	5	4	5	4	4	3	5	4	2
	Native,	29	4	7	2	3	1	3	3	.....	3	2	1
	Foreign,	33	7	6	3	1	4	1	1	3	2	2	1
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sunbury,	Total,	322	114	73	38	32	23	13	16	3	3	4	2
	Native,	319	113	71	38	32	23	13	16	3	3	4	2
	Foreign,	3	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 3.— Continued.

		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Tamaqua,	Total,	263	67	64	36	34	13	14	11	8	4	4	2
	Native,	241	61	61	33	32	12	13	7	7	4	4	1
	Foreign,	22	6	3	3	2	1	1	4	1	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tarentum,	Total,	224	54	55	38	23	10	12	9	9	4	.....	.....
	Native,	132	32	38	21	9	6	5	7	8	3	.....	.....
	Foreign,	92	22	17	17	14	4	7	2	1	1	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Titusville,	Total,	162	53	37	28	14	9	6	6	.....	4	2	1
	Native,	134	47	32	21	10	7	5	4	.....	4	1	1
	Foreign,	28	6	5	7	4	2	1	2	.....	.....	1	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tyrone,	Total,	216	60	46	37	30	9	11	12	1	2	4	1
	Native,	210	59	45	37	28	9	10	12	1	1	4	1
	Foreign,	6	1	1	.....	2	.....	1	.....	.....	1	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Uniontown,	Total,	305	96	69	46	32	22	9	14	9	4	3	.....
	Native,	252	84	59	37	27	13	7	12	6	4	3	.....
	Foreign,	52	11	10	9	5	9	2	2	3	.....	1	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Warren,	Total,	243	94	54	31	24	15	9	7	4	2	.....	2
	Native,	175	68	42	22	14	11	5	6	3	2	.....	1
	Foreign,	68	26	12	9	10	4	4	1	1	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington,	Total,	342	103	93	45	26	22	16	16	6	5	5	1
	Native,	299	95	84	40	21	18	13	14	4	4	4	.....
	Foreign,	42	7	9	5	5	4	3	2	2	1	1	1
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Waynesboro	Total,	199	57	52	36	16	15	7	6	2	1	2	2
	Native,	199	57	52	36	16	15	7	6	2	1	2	2
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
West Chester,	Total,	230	68	58	35	32	14	7	4	5	5	.....	1
	Native,	204	63	49	32	27	11	7	3	5	5	.....	1
	Foreign,	25	4	9	3	5	3	.....	1	.....	.....	.....	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

West Pittston,	Total,	120	46	21	17	12	9	2	5	3	2	2	1
	Native,	70	26	13	9	8	7	1	3	2	.....	.....	1
	Foreign,	50	20	8	8	4	2	1	2	1	2	2	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wilkes-Barre,	Total,	1,460	468	292	212	142	112	72	54	27	14	8	1
	Native,	928	338	193	133	88	61	33	23	12	4	2	.....
	Foreign,	532	130	99	79	54	51	39	31	15	10	6	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wilkinsburg,	Total,	535	192	125	70	41	33	21	6	6	7	2	1
	Native,	460	171	107	63	36	27	15	5	3	4	2	.....
	Foreign,	75	21	18	7	5	6	6	1	3	3	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Williamsport,	Total,	612	210	137	87	63	34	23	21	15	8	9	1
	Native,	550	190	127	76	56	32	19	17	15	6	8	1
	Foreign,	58	19	9	10	6	2	4	4	.....	2	1	.....
	Nat. unstated,	4	1	1	1	1	.....	.....	.....	.....	.....	.....	.....
Wilmerding,	Total,	218	73	48	35	22	17	9	4	3	2	1	.....
	Native,	108	40	25	16	11	6	4	2	1	1	1	.....
	Foreign,	110	33	23	79	11	11	5	2	2	1	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Windber,	Total,	250	54	56	50	34	15	19	7	8	4	3	.....
	Native,	133	54	56	50	34	15	10	2	4	2	.....	.....
	Foreign,	117	26	25	22	17	4	9	5	4	2	3	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
York,	Total,	1,031	303	259	138	90	61	63	35	27	27	6	8
	Native,	994	297	251	130	87	59	60	34	26	24	5	8
	Foreign,	37	6	8	8	3	2	3	1	1	3	1	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
All boroughs between 2,500 and 5,000 population,	Total,	8,151	2,810	1,525	1,086	741	602	400	272	197	157	96	76
	Native,	6,224	2,397	1,126	824	554	405	258	172	139	108	57	48
	Foreign,	1,913	408	395	260	187	197	142	99	58	49	39	28
	Nat. unstated,	14	5	4	2	.....	.....	.....	1	.....	.....	.....	.....
All boroughs less than 2,500 population,	Total,	21,172	5,178	4,574	3,457	2,428	1,659	1,167	830	568	382	266	147
	Native,	15,447	3,906	3,460	2,554	1,772	1,145	813	551	380	240	181	97
	Foreign,	5,650	1,257	1,099	886	649	507	353	278	187	140	84	50
	Nat. unstated,	75	15	15	17	7	7	1	1	1	2	1	.....
Counties (Rural).													
Adams,	Total,	555	127	104	65	70	51	41	25	19	19	14	7
	Native,	553	126	104	65	70	51	40	25	19	19	14	7
	Foreign,	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Allegheny,	Total,	3,492	792	648	536	426	330	218	175	108	91	51	27
	Native,	2,051	517	385	299	246	176	121	97	63	52	26	18
	Foreign,	1,436	274	263	237	179	123	97	78	45	39	24	9
	Nat. unstated,	5	1	.....	.....	1	1	.....	.....	.....	.....	.....	.....

TABLE 3.—Continued.

		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Armstrong,	Total,	982	184	173	151	135	97	84	54	40	23	16	6
	Native,	817	159	139	122	101	88	71	47	34	19	14	5
	Foreign,	164	24	34	29	34	9	13	7	6	4	2	1
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Beaver,	Total,	462	111	74	70	46	45	32	29	12	6	11	4
	Native,	376	91	57	53	39	40	29	26	10	6	9	2
	Foreign,	84	20	17	16	7	5	3	3	2	.....	2	2
	Nat. unstated,	2	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Bedford,	Total,	682	168	110	102	75	71	40	47	22	10	12	8
	Native,	646	155	104	99	75	69	38	46	19	8	9	8
	Foreign,	27	8	5	3	.....	1	1	1	3	2	3	.....
	Nat. unstated,	9	5	1	.....	.....	1	1	.....	.....	.....	.....	.....
Berks,	Total,	1,639	390	293	233	165	143	119	73	77	39	34	21
	Native,	1,587	379	281	223	164	137	114	72	74	38	33	21
	Foreign,	44	9	9	8	1	5	5	1	3	1	1	.....
	Nat. unstated,	8	2	3	2	.....	1	.....	.....	.....	.....	.....	.....
Blair,	Total,	681	156	107	94	82	60	55	24	29	25	15	15
	Native,	612	141	102	87	75	46	52	20	29	20	13	12
	Foreign,	68	14	5	7	7	14	3	4	.....	5	2	3
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bradford,	Total,	660	173	127	113	81	54	41	21	18	13	5	3
	Native,	638	165	127	112	76	51	39	20	17	13	5	3
	Foreign,	20	7	.....	1	4	3	2	1	1	.....	.....	.....
	Nat. unstated,	2	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Bucks,	Total,	825	212	149	120	80	70	46	33	33	28	21	11
	Native,	747	195	138	112	74	58	41	31	28	26	17	9
	Foreign,	77	17	11	8	6	12	5	2	5	2	4	2
	Nat. unstated,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Butler,	Total,	892	270	193	143	112	63	62	32	29	17	13	3
	Native,	717	161	150	113	90	52	57	24	27	15	10	3
	Foreign,	174	46	43	30	22	11	5	8	2	2	3	.....
	Nat. unstated,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cambria,	Total,	1,628	312	284	224	208	142	114	94	71	54	29	28
	Native,	948	190	164	115	128	85	67	53	39	35	13	12
	Foreign,	657	119	118	106	79	51	47	39	31	18	15	16
	Nat. unstated,	23	3	2	3	1	6	.....	2	1	1	1	.....

Cameron,	Total,	102	21	14	20	8	13	9	5	4	3	2	3
	Native,	85	17	12	16	8	11	7	5	1	3	2	3
	Foreign,	16	3	2	4	.....	2	2	.....	3	.....	.....	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carbon,	Total,	568	130	107	88	66	56	35	21	23	15	8	6
	Native,	397	92	73	59	43	44	23	14	17	12	4	4
	Foreign,	169	37	33	29	23	12	12	7	6	3	4	2
	Nat. unstated,	2	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Centre,	Total,	786	173	137	111	107	67	52	37	35	17	12	7
	Native,	682	158	129	93	89	55	46	30	29	15	11	6
	Foreign,	101	15	8	17	17	11	6	7	6	2	1	1
	Nat. unstated,	3	.....	.....	1	1	1	.....	.....	.....	.....	.....	.....
Chester,	Total,	1,101	278	196	158	116	79	90	63	28	28	20	11
	Native,	977	256	172	137	106	64	83	56	21	25	17	11
	Foreign,	121	22	24	21	10	15	7	7	7	3	3	.....
	Nat. unstated,	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Clarion,	Total,	641	145	97	99	85	54	52	35	20	18	13	10
	Native,	604	141	93	89	80	51	50	34	19	15	11	8
	Foreign,	34	3	4	9	4	3	2	1	1	3	2	2
	Nat. unstated,	3	1	.....	1	1	.....	.....	.....	.....	.....	.....	.....
Clearfield,	Total,	1,661	293	268	233	167	161	114	81	74	60	51	29
	Native,	984	223	163	146	92	87	66	44	43	36	31	11
	Foreign,	674	69	105	87	75	73	48	37	31	24	20	18
	Nat. unstated,	3	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Clinton,	Total,	287	64	55	40	32	31	20	19	7	6	2	5
	Native,	262	59	52	34	30	29	17	18	6	6	2	5
	Foreign,	25	5	3	6	2	2	3	1	1	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Columbia,	Total,	541	119	99	103	60	35	33	26	17	19	7	5
	Native,	503	113	90	98	56	33	29	25	15	18	6	5
	Foreign,	38	6	9	5	4	2	4	1	2	1	1	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crawford,	Total,	555	130	140	78	72	45	37	22	9	5	7	3
	Native,	528	126	134	74	69	42	33	22	8	5	6	2
	Foreign,	17	2	3	.....	3	2	4	.....	1	.....	1	1
	Nat. unstated,	10	2	3	4	.....	1	.....	.....	.....	.....	.....	.....
Cumberland,	Total,	539	141	101	89	56	38	36	26	12	14	3	5
	Native,	532	140	101	88	54	38	36	26	12	12	3	5
	Foreign,	4	1	.....	.....	2	.....	.....	.....	.....	1	.....	.....
	Nat. unstated,	3	.....	.....	1	.....	.....	.....	.....	.....	1	.....	.....
Dauphin,	Total,	893	220	161	123	97	86	58	46	39	19	11	14
	Native,	794	202	146	105	86	77	49	42	32	16	10	11
	Foreign,	98	17	15	18	10	9	9	4	7	3	1	3
	Nat. unstated,	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....

TABLE 3.—Continued.

		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Delaware,	Total,	630	169	119	93	60	53	33	23	27	16	6	5
	Native,	471	142	90	70	40	32	18	19	19	12	4	4
	Foreign,	159	27	29	23	20	21	15	4	8	4	2	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Elk,	Total,	600	140	108	79	75	51	46	37	25	13	12	8
	Native,	379	97	64	55	39	28	37	26	15	10	9	5
	Foreign,	220	43	44	23	36	23	19	11	10	3	3	2
	Nat. unstated,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Erie,	Total,	460	122	104	76	43	38	31	14	14	5	5	1
	Native,	414	115	99	69	38	35	27	12	7	3	4	1
	Foreign,	42	7	3	6	5	3	4	2	7	1	1	.....
	Nat. unstated,	4	.....	2	1	.....	.....	.....	.....	.....	1	.....	.....
Fayette,	Total,	2,424	523	444	378	317	204	157	106	77	60	45	28
	Native,	1,510	327	263	233	187	139	116	68	44	43	28	17
	Foreign,	906	196	177	145	128	65	41	38	33	17	17	11
	Nat. unstated,	8	.....	4	.....	2	.....	.....	.....	.....	.....	.....	.....
Forest,	Total,	220	48	32	29	31	21	18	16	8	10	5	.....
	Native,	207	47	31	28	30	18	18	14	6	9	4	.....
	Foreign,	12	1	1	1	1	3	.....	2	1	1	1	.....
	Nat. unstated,	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Franklin,	Total,	876	211	151	121	120	66	67	46	30	18	16	7
	Native,	869	208	151	120	119	66	67	46	30	18	15	7
	Foreign,	6	3	.....	1	1	.....	.....	.....	.....	.....	1	.....
	Nat. unstated,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fulton,	Total,	242	63	43	43	28	23	11	11	9	3	1	.....
	Native,	240	61	43	43	28	23	11	11	9	3	1	.....
	Foreign,	2	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greene,	Total,	463	100	110	78	52	41	29	18	15	8	2	2
	Native,	459	99	109	77	51	41	29	18	15	8	2	2
	Foreign,	3	.....	1	1	1	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huntingdon,	Total,	469	111	89	58	59	45	38	16	9	16	8	5
	Native,	437	106	79	54	58	41	36	15	8	15	8	4
	Foreign,	26	5	9	3	1	4	.....	1	.....	1	.....	1
	Nat. unstated,	6	.....	1	1	.....	.....	2	.....	1	.....	.....	.....

Indian,	Total,	1,442	301	284	209	172	143	95	56	58	26	31	17
	Native,	913	209	188	119	97	83	64	36	36	17	16	14
	Foreign,	523	90	96	89	75	59	31	20	21	9	15	3
	Nat. unstated,	6	2	.....	1	.....	1	.....	.....	1	.....	.....	.....
Jefferson,	Total,	1,241	215	203	192	166	117	111	71	54	39	25	16
	Native,	788	157	150	113	99	69	64	35	31	22	18	9
	Foreign,	453	58	53	79	67	48	47	36	23	17	7	7
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Juniata,	Total,	285	74	53	48	27	23	18	14	7	6	5	.....
	Native,	282	72	52	48	27	23	18	14	7	6	5	.....
	Foreign,	2	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lackawanna,	Total,	420	98	83	71	62	32	16	16	13	8	3	3
	Native,	236	57	50	37	33	17	11	8	6	1	2	3
	Foreign,	183	40	33	34	29	15	5	8	7	7	1	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lancaster,	Total,	1,927	461	381	269	200	154	133	103	77	50	32	19
	Native,	1,894	453	373	263	197	153	130	101	76	50	32	19
	Foreign,	32	8	8	5	3	1	3	2	1	.....	.....	.....
	Nat. unstated,	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Lawrence,	Total,	517	122	97	93	77	46	26	18	9	7	7	4
	Native,	351	85	72	62	50	25	18	15	4	4	5	3
	Foreign,	166	37	25	31	27	21	8	3	5	3	2	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lebanon,	Total,	849	226	171	132	87	76	43	29	35	14	16	5
	Native,	790	210	154	125	77	73	41	28	33	14	15	5
	Foreign,	58	16	16	7	10	3	2	1	2	.....	1	.....
	Nat. unstated,	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lehigh,	Total,	1,159	309	221	173	124	98	61	55	27	25	21	14
	Native,	888	225	161	125	105	76	46	44	22	24	20	12
	Foreign,	267	83	60	48	19	22	15	10	4	1	1	2
	Nat. unstated,	4	1	.....	.....	.....	.....	.....	1	1	.....	.....	.....
Luzerne,	Total,	2,256	457	389	322	266	191	161	119	104	66	48	45
	Native,	979	267	184	131	101	75	58	43	32	20	17	12
	Foreign,	1,274	190	205	191	165	116	102	75	72	46	31	33
	Nat. unstated,	3	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....
Lycoming,	Total,	634	152	118	96	63	61	42	30	27	13	11	8
	Native,	585	144	108	87	57	58	41	27	25	12	10	5
	Foreign,	45	7	9	8	6	3	1	3	2	1	1	3
	Nat. unstated,	4	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....
McKean,	Total,	469	92	93	67	58	44	30	28	18	11	10	2
	Native,	329	82	69	51	38	27	23	16	9	7	6	1
	Foreign,	129	.....	24	16	20	17	7	12	8	4	4	1
	Nat. unstated,	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....

TABLE 3.— Continued.

		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Mercer,	Total,	504	113	97	87	66	42	27	27	16	11	6	1
	Native,	452	99	88	82	58	38	27	22	13	10	6	1
	Foreign,	51	14	8	5	8	4	.....	5	3	1	.....	.....
	Nat. unstated,	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mifflin,	Total,	565	161	105	79	65	39	30	23	13	7	11	10
	Native,	540	154	97	75	63	37	28	29	13	7	11	10
	Foreign,	25	7	8	4	2	2	2	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Monroe,	Total,	281	90	33	36	27	20	18	10	16	8	4	2
	Native,	274	87	39	35	27	19	18	14	16	8	4	2
	Foreign,	6	2	.....	1	.....	1	.....	2	.....	.....	.....	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montgomery,	Total,	1,547	387	322	223	191	112	94	57	45	34	23	19
	Native,	1,244	311	263	174	163	89	71	46	32	28	18	17
	Foreign,	292	66	59	49	28	22	23	11	13	6	5	2
	Nat. unstated,	11	10	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Montour,	Total,	113	34	27	19	16	5	3	2	1	1	1	2
	Native,	111	34	26	19	16	4	3	2	1	1	1	2
	Foreign,	2	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Northampton,	Total,	953	253	186	123	103	85	51	52	34	15	15	9
	Native,	788	214	153	100	81	69	43	43	31	13	13	8
	Foreign,	164	39	33	23	22	16	8	8	3	2	2	1
	Nat. unstated,	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Northumberland,	Total,	1,089	266	214	173	144	74	68	36	35	16	9	7
	Native,	825	219	157	137	108	51	49	28	22	12	8	4
	Foreign,	256	44	57	35	36	23	19	8	12	4	1	2
	Nat. unstated,	8	3	.....	1	.....	.....	.....	.....	1	.....	.....	1
Perry,	Total,	364	70	51	59	54	31	20	17	22	12	10	10
	Native,	357	70	51	58	51	30	20	17	22	10	10	10
	Foreign,	7	.....	.....	1	3	1	.....	.....	.....	2	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pike,	Total,	100	25	23	13	14	7	7	1	5	.....	1	1
	Native,	84	22	19	11	12	6	5	1	5	.....	1	1
	Foreign,	16	3	4	2	2	1	2	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Potter,	Total,	334	110	88	42	25	20	13	9	6	6	2	.....
	Native,	209	100	84	34	20	17	11	9	6	5	2	.....
	Foreign,	34	9	4	8	5	3	8	.....	.....	1	.....	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Schuylkill,	Total,	1,649	358	296	232	186	157	96	85	64	60	35	24
	Native,	1,242	276	217	176	132	121	79	63	45	45	26	17
	Foreign,	406	81	79	56	54	36	17	22	19	15	9	7
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Snyder,	Total,	355	98	69	49	33	34	22	12	14	6	6	7
	Native,	350	98	68	49	32	33	22	11	13	6	6	7
	Foreign,	2	.....	.....	.....	1	.....	.....	.....	1	.....	.....	.....
	Nat. unstated,	3	.....	1	.....	.....	1	.....	1	.....	.....	.....	.....
Somerset,	Total,	1,036	263	193	163	105	70	74	47	42	32	15	14
	Native,	869	219	153	135	79	61	70	43	36	29	15	12
	Foreign,	163	44	40	27	25	9	4	3	6	3	.....	1
	Nat. unstated,	4	.....	.....	1	1	.....	.....	1	.....	.....	.....	1
Sullivan,	Total,	233	47	51	22	27	26	19	16	10	6	4	2
	Native,	206	47	44	18	24	20	18	14	9	6	3	1
	Foreign,	27	.....	7	4	3	6	1	2	1	.....	1	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Susquehanna,	Total,	315	87	75	49	37	15	13	15	10	4	2	2
	Native,	296	84	72	46	34	14	11	14	9	4	2	2
	Foreign,	16	2	3	3	3	1	2	.....	1	.....	.....	.....
	Nat. unstated,	3	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Tioga,	Total,	679	172	124	108	77	57	32	28	26	13	15	6
	Native,	572	160	110	96	65	43	29	21	16	8	10	3
	Foreign,	105	12	14	11	12	14	3	7	10	5	5	3
	Nat. unstated,	2	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Union,	Total,	259	78	54	30	25	17	12	14	11	7	3	3
	Native,	257	77	54	30	24	17	12	14	11	7	3	3
	Foreign,	2	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Venango,	Total,	412	97	83	65	55	35	19	23	8	7	5	6
	Native,	398	92	79	65	53	34	19	23	8	6	5	6
	Foreign,	14	5	4	.....	2	1	.....	.....	.....	1	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Warren,	Total,	469	119	115	67	46	42	24	17	15	8	3	5
	Native,	375	98	93	58	36	37	16	12	10	4	2	3
	Foreign,	94	21	22	9	10	5	8	5	5	4	1	2
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington,	Total,	1,378	314	275	214	170	113	80	56	37	30	26	16
	Native,	906	214	191	139	114	68	52	33	20	20	13	13
	Foreign,	470	100	84	75	56	43	28	23	17	10	13	3
	Nat. unstated,	2	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....

TABLE 3.—Continued.

		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Wayne,	Total,	373	94	67	44	43	27	30	25	12	16	4	3
	Native,	324	87	56	42	34	23	24	21	11	13	4	3
	Foreign,	47	7	10	2	8	4	6	4	1	3	.....	.....
	Nat. unstated,	2	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....
Westmoreland,	Total,	3,427	734	639	522	402	319	233	156	127	87	70	38
	Native,	1,711	392	331	244	197	154	105	82	58	47	41	14
	Foreign,	1,699	339	305	277	202	164	127	73	69	40	29	23
	Nat. unstated,	17	3	3	1	3	1	1	1	.....	.....	.....	1
Wyoming,	Total,	223	50	41	44	26	11	18	10	11	5	3	.....
	Native,	210	49	39	39	25	11	17	8	11	5	2	.....
	Foreign,	12	1	2	4	1	.....	1	2	.....	.....	1	.....
	Nat. unstated,	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
York,	Total,	1,531	362	296	213	177	127	105	68	54	35	38	21
	Native,	1,525	360	296	213	176	126	104	67	54	35	38	21
	Foreign,	5	1	.....	.....	1	1	1	1	.....	.....	.....	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total rural exclusive of all incorporated municipalities,	Total,	55,944	12,922	10,460	8,296	6,547	4,773	3,662	2,632	2,003	1 369	977	628
	Native,	43,287	10,533	8,186	6,325	4,946	3,608	2,824	2,010	1,468	1,041	731	454
	Foreign,	12,472	2,340	2,249	1,948	1,588	1,147	833	613	528	323	244	170
	Nat. unstated,	185	49	25	23	13	18	5	9	7	5	2	4
Total cities and boroughs over 5,000,	Total,	90,537	26,737	19,307	13,287	8,817	6,277	4,355	3,240	2,186	1,502	1,065	596
	Native,	55,982	18,502	12,604	8,152	5,138	3,383	2,307	1,660	1,100	769	513	319
	Foreign,	34,140	8,115	6,640	5,095	3,641	2,862	2,031	1,561	1,080	728	544	275
	Nat. unstated,	415	120	63	40	38	32	17	19	6	5	8	2

TABLE 3.—Continued.

		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	Unstated.
Entire State,	Total,	887	473	269	136	53	25	8	6	4	1	6	3,380
	Native,	575	281	177	84	33	22	3	4	2	1	6	1,990
	Foreign,	306	190	91	51	20	3	5	2	2	.....	.....	1,300
	Nat. unstated,	6	2	1	1	.....	.....	.....	.....	.....	.....	.....	90
Allegheny,	Total,	6	7	7	1	.....	.....	.....	.....	.....	.....	.....	194
	Native,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	156
	Foreign,	5	7	7	1	.....	.....	.....	.....	.....	.....	.....	34
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
Allentown,	Total,	8	4	1	.....	.....	.....	.....	.....	.....	.....	.....	41
	Native,	7	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	35
	Foreign,	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	6
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Altoona,	Total,	7	3	1	.....	.....	.....	.....	.....	.....	.....	.....	9
	Native,	7	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
	Foreign,	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	2
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Archibald,	Total,	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
	Native,	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ashland,	Total,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
	Native,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bangor,	Total,	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	2
	Native,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
	Foreign,	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Beaver Falls,	Total,	2	1	.....	.....	.....	1	.....	.....	.....	.....	.....	7
	Native,	1	1	.....	.....	.....	1	.....	.....	.....	.....	.....	4
	Foreign,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bethlehem,	Total,	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	5
	Native,	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	5
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 3.—Continued.

		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	Unstated.
Bloomsburg,	Total,	1	1	1									
	Native,	1	1	1									
	Foreign,												
	Nat. unstated,												
Braddock,	Total,	1											2
	Native,												1
	Foreign,	1											1
	Nat. unstated,												
Bradford,	Total,	1											11
	Native,	1											8
	Foreign,												3
	Nat. unstated,												
Bristol,	Total,	2						1					25
	Native,	1						1					6
	Foreign,	1											13
	Nat. unstated,												6
Butler,	Total,		1										
	Native,		1										
	Foreign,												
	Nat. unstated,												
Carbondale,	Total,	2											40
	Native,	1											34
	Foreign,	1											5
	Nat. unstated,												1
Carlisle,	Total,	3	1										2
	Native,	3	1										2
	Foreign,												
	Nat. unstated,												
Carnegie,	Total,	1	1										1
	Native,	1											
	Foreign,		1										1
	Nat. unstated,												
Chambersburg,	Total,	5		1									2
	Native,	5		1									2
	Foreign,												
	Nat. unstated,												

Charleroi,	Total,													3
	Native,													2
	Foreign,													1
	Nat. unstated,													
Chester,	Total,	5	2											15
	Native,	4	1											12
	Foreign,	1	1											3
	Nat. unstated,													
Clearfield,	Total,	1												11
	Native,	1												9
	Foreign,													1
	Nat. unstated,													1
Coatesville,	Total,		2											2
	Native,		2											2
	Foreign,													
	Nat. unstated.													
Columbia,	Total,		3	1										
	Native,		3	1										
	Foreign,													
	Nat. unstated,													
Connellsville,	Total,	1	1	1										9
	Native,													7
	Foreign,	1	1	1										2
	Nat. unstated,													
Conshohocken,	Total,				1									6
	Native,													4
	Foreign,				1									2
	Nat. unstated,													
Corry,	Total,		1											
	Native,													
	Foreign,		1											
	Nat. unstated,													
Danville,	Total,	2												1
	Native,	2												1
	Foreign,													
	Nat. unstated,													
Dickson City,	Total,	2		1	1									
	Native,													
	Foreign,	2		1	1									
	Nat. unstated,													
DuBois,	Total,		2	1	2									
	Native,		1		1									
	Foreign,		1	1	1									
	Nat. unstated,													

TABLE 3.—Continued.

		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	Unstated.
Dunmore,	Total,	3	2	1	1								1
	Native,	1	1	1									
	Foreign,	2	1		1								
	Nat. unstated,												1
Duquesne,	Total,	4	1										12
	Native,												3
	Foreign,	4	1										9
	Nat. unstated,												
Easton,	Total,		2	1									3
	Native,		2										3
	Foreign,			1									
	Nat. unstated,												
Edwardsville,	Total,	2											8
	Native,												2
	Foreign,												4
	Nat. unstated,												2
Erie,	Total,	2											63
	Native,	1											39
	Foreign,	1											23
	Nat. unstated,												1
Etna,	Total,	1	2										7
	Native,		1										3
	Foreign,	1	1										4
	Nat. unstated,												
Forest City,	Total,	4	1		2								
	Native,	1											
	Foreign,	3	1		2								
	Nat. unstated,												
Franklin,	Total,		1										3
	Native,		1										2
	Foreign,												1
	Nat. unstated,												
Freeland,	Total,	3			1								2
	Native,	2			1								1
	Foreign,	1											1
	Nat. unstated,												

Greensburg,	Total,	2	1	3									2
	Native,	1	1	2									1
	Foreign,	1		1									1
	Nat. unstated,												
Greensville,	Total,		3										4
	Native,		2										4
	Foreign,		1										
	Nat. unstated,												
Hanover,	Total,				1								2
	Native,				1								2
	Foreign,												
	Nat. unstated,												
Harrisburg,	Total,		2	3	3				1				8
	Native,		2	3	2				1				8
	Foreign,				1								
	Nat. unstated,												
Hazleton,	Total,	2	3										10
	Native,												7
	Foreign,	2	3										3
	Nat. unstated,												
Homestead,	Total,		2		1				2				3
	Native,		1										2
	Foreign,		1		1				2				1
	Nat. unstated,												
Huntingdon,	Total,												
	Native,												
	Foreign,												
	Nat. unstated,												
Indiana,	Total,												2
	Native,												1
	Foreign,												1
	Nat. unstated,												
Jeannette,	Total,		2		1								1
	Native,		1		1								1
	Foreign,		1										
	Nat. unstated,												
Johnsonburg,	Total,		1										3
	Native,												2
	Foreign,		1										1
	Nat. unstated,												
Johnstown,	Total,	12	1	1	2								21
	Native,	7		1	2								13
	Foreign,	3	1										6
	Nat. unstated,	2											2

TABLE 3.—Continued.

		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	Unstated.
Kane,	Total,	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Native,	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,							.....	.....	.....	.....	.....	.....
Lancaster,	Total,	6	1	.....	1	.....	.....	.....	.....	.....	.....	.....	11
	Native,	5	1	.....	1	.....	.....	.....	.....	.....	.....	.....	7
	Foreign,	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lansford,	Total,	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
	Native,	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Latrobe,	Total,	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
	Native,	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lebanon,	Total,	2	1	2	.....	.....	.....	.....	.....	1	.....	.....	1
	Native,	2	1	2	.....	.....	.....	.....	.....	1	.....	.....	1
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lehighton,	Total,	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Native,	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lewistown,	Total,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
	Native,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lock Haven,	Total,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
	Native,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
McKeesport,	Total,	7	2	1	1	.....	1	.....	.....	.....	.....	.....	10
	Native,	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	7
	Foreign,	6	2	1	1	.....	.....	.....	.....	.....	.....	.....	3
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

McKees Rocks,	Total,	1											34
	Native,	1											2
	Foreign,												32
	Nat. unstated,												
Mahanoy City,	Total,	5											49
	Native,	2											12
	Foreign,	3											34
	Nat. unstated,												3
Meadville,	Total,	1											3
	Native,	1											
	Foreign,												1
	Nat. unstated,												2
Middletown,	Total,	1											2
	Native,	1											2
	Foreign,												
	Nat. unstated,												
Millvale,	Total,		3	1	1								3
	Native,		1										1
	Foreign,		2	1	1								1
	Nat. unstated,												1
Milton,	Total,												4
	Native,												4
	Foreign,												
	Nat. unstated,												
Minersville,	Total,	3	4	1									
	Native,	1	1										
	Foreign,	2	3	1									
	Nat. unstated,												
Monongahela,	Total,	4	2										1
	Native,	2	1										
	Foreign,	2	1										1
	Nat. unstated,												
Mount Carmel,	Total,	1	2	1			1						13
	Native,		1	1									6
	Foreign,	1	1				1						7
	Nat. unstated,												
Mount Pleasant,	Total,	2											7
	Native,	2											3
	Foreign,												4
	Nat. unstated,												
Nanticoke,	Total,	9	3	4		2		1					1
	Native,					1							
	Foreign,	9	3	4		1		1					1
	Nat. unstated,												

TABLE 3.—Continued.

		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	Unstated.
New Brighton,	Total,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
	Native,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Castle,	Total,	2	1	2	1	.....	.....	.....	.....	.....	.....	.....	3
	Native,	2	1	1	.....	.....	.....	.....	.....	.....	.....	.....	2
	Foreign,	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norristown,	Total,	2	1	1	1	.....	.....	.....	.....	.....	.....	.....	8
	Native,	2	1	1	.....	.....	.....	.....	.....	.....	.....	.....	5
	Foreign,	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	3
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Braddock,	Total,	3	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....
	Native,	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
	Foreign,	3	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oil City,	Total,	.....	2	.....	.....	1	.....	.....	.....	.....	.....	.....	11
	Native,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
	Foreign,	.....	2	.....	.....	1	.....	.....	.....	.....	.....	.....	2
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Old Forge,	Total,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
	Native,	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Foreign,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Olyphant,	Total,	2	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
	Native,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Foreign,	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Philadelphia,	Total,	121	66	46	20	12	.....	2	.....	2	.....	.....	1,021
	Native,	60	28	27	10	8	.....	.....	.....	.....	.....	.....	330
	Foreign,	60	38	18	10	4	.....	2	.....	2	.....	.....	668
	Nat. unstated,	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	23
Phoenixville,	Total,	2	3	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	Native,	1	2	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	Foreign,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Pittsburg,	Total,	33	19	4	4	1			1				441
	Native,	11	6	2	1				1				236
	Foreign,	22	13	2	3	1							194
	Nat. unstated,												11
Pittston,	Total,	3	2			1							18
	Native,	2	2										5
	Foreign,	1				1							13
	Nat. unstated,												
Plymouth,	Total,		6	1									3
	Native,		1	1									2
	Foreign,		5										1
	Nat. unstated,												
Pottstown,	Total,	3	2	1									3
	Native,	1											3
	Foreign,	2	2	1									
	Nat. unstated,												
Pottsville,	Total,	5	2	1									
	Native,	5		1									
	Foreign,		2										
	Nat. unstated,												
Punxsutawney,	Total,	1											2
	Native,	1											1
	Foreign,												1
	Nat. unstated,												
Reading,	Total,	12	7	4	3								4
	Native,	9	6	4	1								3
	Foreign,	3	1		2								1
	Nat. unstated,												
Rochester,	Total,												2
	Native,												1
	Foreign,												1
	Nat. unstated,												
Saint Clair,	Total,												
	Native,												
	Foreign,												
	Nat. unstated,												
Saint Marys,	Total,	1		1									2
	Native,	1											2
	Foreign,			1									
	Nat. unstated,												
Sayre,	Total,												1
	Native,												1
	Foreign,												
	Nat. unstated,												

TABLE 3.—Continued.

		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	Unstated.
Scottdale,	Total,												
	Native,												
	Foreign,												
	Nat. unstated,												
Scranton,	Total,	13	6	6	3	2	1						52
	Native,	2	2				1						31
	Foreign,	11	4	6	3	2							20
	Nat. unstated,												1
Shamokin,	Total,	1	2	2		1							1
	Native,	1	2	2		1							1
	Foreign,												
	Nat. unstated,												
Sharon,	Total,	2	2										5
	Native,	1	2										3
	Foreign,	1											2
	Nat. unstated,												
Sharpsburg,	Total,												4
	Native,												1
	Foreign,												3
	Nat. unstated,												
Shenandoah,	Total,	3	3	1			1						7
	Native,	2	1	1			1						4
	Foreign,	1	2										3
	Nat. unstated,												
South Bethlehem,	Total,	5	1	2	1	1							2
	Native,	2			1	1							1
	Foreign,	3	1	2									1
	Nat. unstated,												
Steelton,	Total,	1		1									3
	Native,												
	Foreign,	1		1									3
	Nat. unstated,												
Sugar Notch,	Total,	1			1								
	Native,												
	Foreign,	1			1								
	Nat. unstated,												

Sunbury,	Total,											1	
	Native,											1	
	Foreign,												
	Nat. unstated,												
Tamaqua,	Total,		2									4	
	Native,		2									4	
	Foreign,												
	Nat. unstated,												
Tarentum,	Total,	2	1										7
	Native,	1											2
	Foreign,	1	1										5
	Nat. unstated,												
Titusville,	Total,						1						1
	Native,						1						1
	Foreign,												
	Nat. unstated,												
Tyrone,	Total,	1	1	1									
	Native,	1	1	1									
	Foreign,												
	Nat. unstated,												
Uniontown,	Total,												
	Native,												
	Foreign,												
	Nat. unstated,												
Warren,	Total,	1											
	Native,	1											
	Foreign,												
	Nat. unstated,												
Washington,	Total,	1	1										2
	Native,												2
	Foreign,	1	1										
	Nat. unstated,												
Waynesboro,	Total,	2	1										
	Native,	2	1										
	Foreign,												
	Nat. unstated,												
West Chester,	Total,											1	
	Native,											1	
	Foreign,												
	Nat. unstated,												
West Pittston,	Total,												
	Native,												
	Foreign,												
	Nat. unstated,												

TABLE 3.—Continued.

		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	Unstated.
Wilkes-Barre,	Total,	1											57
	Native,												41
	Foreign,	1											16
	Nat. unstated,												
Wilkinsburg,	Total,	1	2	2									26
	Native,	1		2									24
	Foreign,		2										2
	Nat. unstated,												
Williamsport,	Total,		2	1									1
	Native,		2	1									
	Foreign,												1
	Nat. unstated,												
Wilmerding,	Total,			1									3
	Native,												1
	Foreign,			1									2
	Nat. unstated,												
Windber,	Total,												
	Native,												
	Foreign,												
	Nat. unstated,												
York,	Total,	4	4	1	2		1		1				1
	Native,	4	3	1	2		1		1				1
	Foreign,		1										
	Nat. unstated,												
All boroughs between 2,500 and 5,000 population,	Total,	42	24	8	8	2	4						101
	Native,	31	13	7	6	2	4						73
	Foreign,	11	11	1	2								26
	Nat. unstated,												2
All boroughs less than 2,500 population,	Total,	96	48	35	20	3	1	1					312
	Native,	66	33	20	13	3	1						212
	Foreign,	28	15	15	7			1					94
	Nat. unstated,	2											6
Counties (Rural).													
Adams,	Total,	7	3	3									
	Native,	7	3	3									
	Foreign,												
	Nat. unstated,												

Allegheny,	Total,	24	19	1	2	1	1	1					71
	Native,	10	11		2			1					27
	Foreign,	14	8	1		1	1						43
	Nat. unstated,												1
Armstrong,	Total,	7				1							11
	Native,	6				1							11
	Foreign,	1											
	Nat. unstated,												
Beaver,	Total,	4	1	1									16
	Native,	3		1									10
	Foreign,	1	1										5
	Nat. unstated,												1
Bedford,	Total,	5	3	1	2		1						5
	Native,	5	3	1	2		1						4
	Foreign,												
	Nat. unstated,												1
Berks,	Total,	16	6	4		1				1			24
	Native,	16	5	4		1				1			24
	Foreign,		1										
	Nat. unstated,												
Blair,	Total,	4	2	2	1		1						9
	Native,	4	2	1									8
	Foreign,			1	1		1						1
	Nat. unstated,												
Bradford,	Total,	2											9
	Native,	2											8
	Foreign,												1
	Nat. unstated,												
Bucks,	Total,	2	6	2	1								11
	Native,	2	6	2									8
	Foreign,				1								2
	Nat. unstated,												1
Butler,	Total,	5		1	1								11
	Native,	5		1	1								8
	Foreign,												2
	Nat. unstated,												1
Cambria,	Total,	19	8	6	3	1	1						30
	Native,	9	5	6	2	1	1						23
	Foreign,	10	2		1								5
	Nat. unstated,		1										2
Cameron,	Total,												
	Native,												
	Foreign,												
	Nat. unstated,												

TABLE 3.—Continued.

		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	Unstated.
Carbon,	Total,	6	1	2	.....	.....	.....	.....	.....	.....	.....	.....	4
	Native,	6	1	2	.....	.....	.....	.....	.....	.....	.....	.....	3
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Centre,	Total,	8	3	4	2	1	.....	.....	.....	.....	.....	.....	13
	Native,	4	2	4	2	1	.....	.....	.....	.....	.....	.....	8
	Foreign,	4	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chester,	Total,	11	7	3	1	.....	.....	.....	.....	.....	.....	.....	12
	Native,	9	6	3	1	.....	.....	.....	.....	.....	.....	.....	10
	Foreign,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Clarion,	Total,	6	2	2	.....	.....	.....	.....	.....	.....	.....	.....	3
	Native,	6	2	2	.....	.....	.....	.....	.....	.....	.....	.....	3
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Clearfield,	Total,	24	8	4	.....	3	.....	.....	.....	.....	.....	.....	91
	Native,	10	4	1	.....	.....	.....	.....	.....	.....	.....	.....	27
	Foreign,	14	4	3	.....	3	.....	.....	.....	.....	.....	.....	63
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Clinton,	Total,	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	4
	Native,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
	Foreign,	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Columbia,	Total,	7	3	4	.....	.....	.....	.....	.....	.....	.....	.....	4
	Native,	5	3	3	.....	.....	.....	.....	.....	.....	.....	.....	4
	Foreign,	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crawford,	Total,	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
	Native,	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cumberland,	Total,	3	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	14
	Native,	3	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	13
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1

Dauphin,	Total,	5	5	1	1	1	1							5
	Native,	5	3	1	1	1	1							5
	Foreign,		2											
	Nat. unstated,													
Delaware,	Total,	2	2	1	2	1								18
	Native,	2	2		2	1								14
	Foreign,			1										4
	Nat. unstated,													
Elk,	Total,	2	1	1										2
	Native,		1	1										1
	Foreign,	2												1
	Nat. unstated,													
Erie,	Total,	2		2										3
	Native,	1												3
	Foreign,	1		2										
	Nat. unstated,													
Fayette,	Total,	20	7	4	4	1								49
	Native,	13	2	4	4									22
	Foreign,	7	5			1								25
	Nat. unstated,													2
Forest,	Total,													2
	Native,													2
	Foreign,													
	Nat. unstated,													
Franklin,	Total,	5	5	2	3	1								7
	Native,	5	5	2	3	1								7
	Foreign,													
	Nat. unstated,				1									
Fulton,	Total,													7
	Native,													7
	Foreign,													
	Nat. unstated,													
Greene,	Total,	6												2
	Native,	6												2
	Foreign,													
	Nat. unstated,													
Huntingdon,	Total,	7	1	1										6
	Native,	7	1	1										4
	Foreign,													1
	Nat. unstated,													1
Indian,	Total,	9	3	1	1	1								35
	Native,	5	3	1	1	1								23
	Foreign,	4												11
	Nat. unstated,													1

TABLE 3.—Continued.

		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	Unstated.
Jefferson,	Total,	7	6	1	3	1	2						12
	Native,	5	2		2		2						10
	Foreign,	2	4	1	1	1							2
	Nat. unstated,												
Juniata,	Total,	1	1										8
	Native,	1	1										8
	Foreign,												
	Nat. unstated,												
Lackawanna,	Total,	3	2	1									9
	Native,	3		1									7
	Foreign,		2										2
	Nat. unstated,												
Lancaster,	Total,	16	7	7	3	1	2						12
	Native,	16	7	7	3	1	2						12
	Foreign,		1										
	Nat. unstated,												
Lawrence,	Total,	4		1									6
	Native,	3											5
	Foreign,	1		1									1
	Nat. unstated,												
Lebanon,	Total,	6	1	2	1								5
	Native,	6	1	2	1								5
	Foreign,												
	Nat. unstated,												
Lehigh,	Total,	7	5	4	2								13
	Native,	6	5	3	2								12
	Foreign,	1		1									
	Nat. unstated,												1
Luzerne,	Total,	19	6	5	3	1							54
	Native,	12	5	4	3								15
	Foreign,	7	1	1		1							38
	Nat. unstated,												1
Lycoming,	Total,	7	2	2									2
	Native,	6	2	2									1
	Foreign,	1											
	Nat. unstated,												1

McKean,	Total,	3	4		3								6
	Native,	2	2		2								4
	Foreign,	1	2		1								2
	Nat. unstated,												
Mercer,	Total,	1	2	1									7
	Native,		1	1									6
	Foreign,	1	1										1
	Nat. unstated,												
Mifflin,	Total,	5	1					1					9
	Native,	5	1					1					9
	Foreign,												
	Nat. unstated,												
Monroe,	Total,	1	1	1									2
	Native,	1	1	1									2
	Foreign,												
	Nat. unstated,												
Montgomery,	Total,	5	4	2	2								27
	Native,	3	3	2	1								23
	Foreign,	2	1		1								4
	Nat. unstated,												
Montour,	Total,												2
	Native,												2
	Foreign,												
	Nat. unstated,												
Northampton,	Total,	8	4	3		1							11
	Native,	6	3	3		1							7
	Foreign,	2	1										4
	Nat. unstated,												
Northumberland,	Total,	4		1									42
	Native,	4		1									25
	Foreign,												15
	Nat. unstated,												2
Perry,	Total,	1											7
	Native,	1											7
	Foreign,												
	Nat. unstated,												
Pike,	Total,		1										2
	Native,												1
	Foreign,		1										1
	Nat. unstated,												
Potter,	Total,	1											12
	Native,	1											10
	Foreign,												2
	Nat. unstated,												

TABLE 3.—Continued.

		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	Unstated.
Schuylkill,	Total,	9	12	4	1	5	2	.....	.....	.....	.....	.....	23
	Native,	6	10	3	1	4	2	.....	.....	.....	.....	.....	19
	Foreign,	3	2	1	.....	1	.....	.....	.....	.....	.....	.....	4
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Snyder,	Total,	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	2
	Native,	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	2
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Somerset,	Total,	5	1	5	.....	.....	.....	.....	.....	.....	.....	.....	7
	Native,	5	1	5	.....	.....	.....	.....	.....	.....	.....	.....	6
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sullivan,	Total,	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	Native,	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Susquehanna,	Total,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6
	Native,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Tioga,	Total,	4	4	1	1	2	.....	.....	.....	.....	.....	.....	10
	Native,	2	.....	1	1	.....	.....	.....	.....	.....	.....	.....	7
	Foreign,	1	4	.....	.....	2	.....	.....	.....	.....	.....	.....	2
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Union,	Total,	1	1	1	1	1	.....	.....	.....	.....	.....	.....	.....
	Native,	1	1	1	1	1	.....	.....	.....	.....	.....	.....	.....
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Venango,	Total,	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
	Native,	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Warren,	Total,	2	1	.....	.....	1	.....	.....	.....	.....	.....	.....	4
	Native,	2	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	3
	Foreign,	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Washington,	Total,	10	5	1	1	.....	.....	.....	.....	.....	1	.....	29
	Native,	7	4	.....	1	.....	.....	.....	.....	.....	1	.....	16
	Foreign,	3	1	1	.....	.....	.....	.....	.....	.....	.....	.....	13
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wayne,	Total,	2	3	1	.....	.....	.....	.....	.....	.....	.....	.....	2
	Native,	2	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
	Foreign,	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Westmoreland,	Total,	20	9	6	5	.....	.....	.....	1	.....	.....	.....	59
	Native,	12	4	2	2	.....	.....	.....	1	.....	.....	.....	25
	Foreign,	8	5	4	3	.....	.....	.....	.....	.....	.....	.....	31
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
Wyoming,	Total,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
	Native,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
York,	Total,	12	5	1	.....	2	.....	.....	.....	.....	.....	.....	15
	Native,	12	5	1	.....	2	.....	.....	.....	.....	.....	.....	15
	Foreign,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total rural exclusive of all incorporated municipalities,	Total,	387	187	108	50	28	11	2	1	1	1	.....	899
	Native,	292	133	87	40	18	9	2	1	1	1	.....	576
	Foreign,	94	52	21	9	10	2	.....	.....	.....	.....	.....	299
	Nat. unstated,	1	2	.....	1	.....	.....	.....	.....	.....	.....	.....	24
Total cities and boroughs over 5,000,	Total,	362	214	118	58	20	9	5	5	3	.....	6	2,368
	Native,	186	102	63	25	10	8	1	3	1	.....	6	1,130
	Foreign,	73	112	54	33	10	1	4	2	2	.....	.....	1,177
	Nat. unstated,	3	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	61

TABLE 4.

Illegitimate Births by Locality and Nativity of Mothers.

	Total.	Native.	Foreign.	Nativity Unstated.
Entire State,	3,909	3,386	462	61
Allegheny,	98	80	18	.....
Allentown,	23	16	6	1
Altoona,	35	34	1	.....
Archbald,	1	1	.....	.....
Ashland,	8	8	.....	.....
Bangor,	1	1	.....	.....
Beaver Falls,	6	5	1	.....
Bethlehem,	10	10	.....	.....
Bloomsburg,	2	2	.....	.....
Braddock,	6	3	3	.....
Bradford,	5	5	.....	.....
Bristol,	3	3	.....	.....
Butler,	7	5	2	.....
Carbondale,	7	7	.....	.....
Carlisle,	13	13	.....	.....
Carnegie,	4	2	2	.....
Chambersburg,	11	11	.....	.....
Charleroi,	1	1	.....	.....
Chester,	15	15	.....	.....
Clearfield,	10	10	.....	.....
Coatesville,	7	7	.....	.....
Columbia,	7	7	.....	.....
Connellsville,	4	4	.....	.....
Conshohocken,	2	2	.....	.....
Corry,	2	2	.....	.....
Danville,	3	3	.....	.....
Dickson City,	1	1	.....	.....
DuBois,	6	6	.....	.....
Dunmore,	17	4	3	10
Duquesne,	2	1	1	.....
Easton,	11	10	1	.....
Erie,	16	15	1	.....
Etna,	1	.....	1	.....
Franklin,	7	7	.....	.....
Freeland,	2	2	.....	.....
Greensburg,	6	6	.....	.....
Greenville,	1	1	.....	.....
Hanover,	5	4	.....	1
Harrisburg,	50	48	2	.....
Hazleton,	6	6	.....	.....
Homestead,	5	5	.....	.....
Huntingdon,	5	5	.....	.....
Indiana,	4	4	.....	.....
Jeannette,	5	5	.....	.....
Johnsonburg,	3	1	1	1
Johnstown,	14	11	2	1
Kane,	3	2	1	.....
Lancaster,	26	26	.....	.....
Lansford,	2	2	.....	.....
Latrobe,	3	3	.....	.....
Lebanon,	8	8	.....	.....
Lehighton,	6	6	.....	.....
Lewistown,	8	8	.....	.....
Lock Haven,	3	3	.....	.....
McKeesport,	19	11	7	1
McKees Rocks,	1	1	.....	.....
Mahanoy City,	5	5	.....	.....
Meadville,	5	5	.....	.....
Middletown,	5	5	.....	.....
Millvale,	3	2	1	.....
Milton,	2	2	.....	.....
Minersville,	1	1	.....	.....
Monongahela,	1	1	.....	.....
Mount Carmel,	4	4	.....	.....
Mount Pleasant,	4	4	.....	.....
Nanticoke,	3	2	1	.....
New Brighton,	5	4	1	.....
New Castle,	9	7	2	.....
Norristown,	17	13	3	1
North Braddock,	4	4	.....	.....
Oil City,	1	1	.....	.....
Olyphant,	4	1	3	.....
Philadelphia,	899	733	140	26
Phoenixville,	3	3	.....	.....
Pittsburg,	283	212	64	7
Pittston,	5	4	1	.....
Plymouth,	3	3	.....	.....
Pottstown,	8	8	.....	.....
Pottsville,	10	9	1	.....
Punxsutawney,	4	4	.....	.....
Reading,	60	51	9	.....

TABLE 4.—Continued.

	Total.	Native.	Foreign.	Nativity Unstated.
Saint Clair,	2	2		
Saint Mary's,	2	2		
Scottdale,	2	2		
Scranton,	26	19	7	
Shamokin,	12	11	1	
Sharon,	5	4	1	
Shenandoah,	3	2	1	
South Bethlehem,	14	6	8	
Steelton,	10	9	1	
Sunbury,	10	10		
Tamaqua,	8	8		
Tarentum,	2	2		
Titusville,	1	1		
Tyrone,	9	9		
Uniontown,	12	11	1	
Warren,	4		4	
Washington,	12	12		
Waynesboro,	5	5		
West Chester,	15	15		
Windber,	1	1		
Wilkes-Barre,	29	23	6	
Wilkinsburg,	2	2		
Williamsport,	19	19		
Wilmerding,	1	1		
York,	24	23	1	
Counties.				
Adams,	13	12		1
Allegheny,	58	47	11	
Armstrong,	24	24		
Beaver,	8	7	1	
Bedford,	16	16		
Berks,	46	45		1
Blair,	35	34	1	
Bradford,	35	34	1	
Bucks,	27	27		
Butler,	15	14	1	
Cambria,	31	27	4	
Carbon,	20	20		
Chester,	36	36		
Clarion,	17	17		
Clearfield,	39	32	6	1
Clinton,	8	8		
Columbia,	17	16	1	
Crawford,	6	6		
Cumberland,	13	13		
Dauphin,	32	31	1	
Delaware,	10	10		
Elk,	5		5	
Erie,	5	4	1	
Fayette,	54	49	5	
Forest,	6	6		
Franklin,	30	30		
Greene,	22	22		
Huntingdon,	6	6		
Indiana,	25	23	2	
Jefferson,	23	23		
Juniata,	9	9		
Lackawanna,	12	10	1	1
Lancaster,	47	47		
Lawrence,	7	5	2	
Lebanon,	22	22		
Lehigh,	43	35	7	1
Luzerne,	19	15	4	
Lycoming,	21	20	1	
McKean,	5	5		
Mercer,	8	7	1	
Mifflin,	17	17		
Monroe,	13	13		
Montgomery,	26	23	3	
Northampton,	21	21		
Northumberland,	29	27	2	
Perry,	17	17		
Pike,	2	2		
Potter,	4	4		
Schuylkill,	43	35	8	
Snyder,	15	15		
Somerset,	19	18	1	
Sullivan,	3	3		
Susquehanna,	4	3	1	
Tioga,	8	7	1	
Union,	6	6		
Venango,	5	4	1	
Warren,	8	7	1	

TABLE 4.—Continued.

	Total.	Native.	Foreign.	Nativity Unstated.
Washington,	26	21	4	1
Wayne,	2	2	.....	.....
Westmoreland,	50	44	6	.....
Wyoming,	7	7	.....	.....
York,	33	33	.....	.....
All boroughs between 2,500 and 5,000 population,	127	105	22	.....
All boroughs less than 2,500 population,	434	382	46	6

TABLE 5.

Plural Births, Twins, by Localities and Nativity of Mothers.

Entire State,	1,786	1,153	627	6
Allegheny,	24	10	14	.....
Allentown,	12	9	3	.....
Altoona,	9	7	2	.....
Archbald,	2	.....	2	.....
Ashland,	3	2	1	.....
Bangor,	2	2	.....	.....
Beaver Falls,	1	.....	1	.....
Bethlehem,	3	3	.....	.....
Bloomsburg,	1	1	.....	.....
Braddock,	7	3	4	.....
Bradford,	1	1	.....	.....
Bristol,	4	4	.....	.....
Butler,	5	4	1	.....
Carbondale,	4	3	.....	1
Carlisle,	1	1	.....	.....
Carnegie,	3	2	1	.....
Chambersburg,	3	3	.....	.....
Charleroi,	2	2	.....	.....
Chester,	4	4	.....	.....
Clearfield,	1	1	.....	.....
Coatesville,	1	1	.....	.....
Columbia,	2	2	.....	.....
Conshohocken,	2	1	1	.....
Danville,	5	5	.....	.....
Dickson City,	1	.....	1	.....
DuBois,	5	4	1	.....
Dunmore,	5	2	2	1
Duquesne,	1	.....	1	.....
Easton,	5	5	.....	.....
Edwardsville,	7	.....	7	.....
Erie,	18	11	7	.....
Etna,	1	1	.....	.....
Franklin,	4	4	.....	.....
Freeland,	3	2	1	.....
Greensburg,	3	2	1	.....
Greenville,	2	2	.....	.....
Harrisburg,	15	13	2	.....
Hazleton,	2	.....	2	.....
Homestead,	1	1	.....	.....
Huntingdon,	2	2	.....	.....
Jeannette,	1	1	.....	.....
Johnsonburg,	3	3	.....	.....
Johnstown,	12	8	3	1
Kane,	3	1	2	.....
Lancaster,	10	8	2	.....
Lansford,	3	2	1	.....
Latrobe,	1	.....	1	.....
Lebanon,	3	2	1	.....
Lewistown,	3	3	.....	.....
McKeesport,	14	3	11	.....
McKees Rocks,	3	1	2	.....
Mahanoy City,	4	1	3	.....
Meadville,	3	3	.....	.....
Middletown,	3	3	.....	.....
Millvale,	2	2	.....	.....
Milton,	1	1	.....	.....
Minersville,	2	.....	2	.....
Mount Pleasant,	2	.....	2	.....
Nanticoke,	4	2	2	.....
New Brighton,	1	1	.....	.....
New Castle,	12	6	6	.....
Norristown,	3	3	.....	.....
North Braddock,	2	1	1	.....
Oil City,	5	5	.....	.....

TABLE 5.—Continued.

	Total.	Native.	Foreign.	Nativity Unstated.
Old Forge,	3		3	
Olyphant,	2		2	
Philadelphia,	340	185	153	2
Phoenixville,	5		5	
Pittsburg,	106	51	54	1
Pittston,	4	1	3	
Plymouth,	7	4	3	
Pottstown,	3	3		
Pottsville,	5	3	2	
Punxsutawney,	3	3		
Reading,	20	14	6	
Sayre,	1	1		
Scranton,	22	14	8	
Shamokin,	6	5	1	
Sharon,	2	2		
Sharpsburg,	2	2		
Shenandoah,	5	2	3	
South Bethlehem,	6	3	3	
Steelton,	5	2	3	
Sugar Notch,	1	1		
Tamaqua,	6	4	2	
Tarentum,	1		1	
Titusville,	3	3		
Tyrone,	4	4		
Uniontown,	5	3	2	
Warren,	1	1		
Washington,	3	2	1	
Waynesboro,	3	3		
West Chester,	1	1		
Windber,	2		2	
Wilkes-Barre,	16	9	7	
Wilkinsburg,	2	2		
Williamsport,	7	7		
York,	12	11	1	
All boroughs between 2,500 and 5,000 population.	85	58	27	
All boroughs less than 2,500 population,	222	157	65	
Counties.				
Adams,	6	6		
Allegheny,	60	30	30	
Armstrong,	8	8		
Beaver,	7	6	1	
Bedford,	5	4	1	
Berks,	21	21		
Blair,	9	8	1	
Bradford,	10	9	1	
Bucks,	8	7	1	
Butler,	13		13	
Cambria,	12	2	10	
Cameron,	1	1		
Carbon,	11	3	8	
Chester,	9	8	1	
Clarion,	7	7		
Clearfield,	17	9	8	
Clinton,	3	3		
Columbia,	3	3		
Crawford,	7	6	1	
Cumberland,	9	9		
Dauphin,	1		1	
Delaware,	10	6	4	
Elk,	3	1	2	
Erie,	7	7		
Fayette,	37	22	15	
Forest,	1		1	
Franklin,	14	14		
Greene,	2	2		
Huntingdon,	4	3	1	
Indiana,	17	12	5	
Jefferson,	5	4	1	
Juniata,	1	1		
Lackawanna,	2	2		
Lancaster,	19	19		
Lawrence,	7	5	2	
Lebanon,	2	2		
Lehigh,	5	5		
Luzerne,	19	10	9	
Lycoming,	7	6	1	
McKean,	8	6	2	
Mercer,	5	5		
Mifflin,	1	1		
Monroe,	3	2	1	
Montgomery,	18	15	3	
Northampton,	12	12		
Northumberland,	9	6	3	
Perry,	4	3	1	

TABLE 5.—Continued.

	Total.	Native.	Foreign.	Nativity Unstated.
Schuylkill,	13	9	4	.....
Snyder,	3	3	.....	.....
Somerset,	14	11	3	.....
Sullivan,	2	1	1	.....
Susquehanna,	2	2	.....	.....
Tioga,	8	6	2	.....
Union,	4	4	.....	.....
Venango,	3	3	.....	.....
Warren,	4	2	2	.....
Washington,	18	13	5	.....
Wayne,	6	5	1	.....
Westmoreland,	45	15	30	.....
Wyoming,	2	2	.....	.....
York,	15	15	.....	.....

The Sub-Division of Morbidity Statistics

In charge of WILMER R. BATT, M. D., Registrar.

THE DIVISION OF MORBIDITY STATISTICS.

COMMUNICABLE DISEASES.

A total of 70,864 cases of communicable diseases were reported during the year. This is a decrease of 17,456 cases as compared with the previous year.

The following comparisons will show the increase and decrease for each of the several diseases.

	1906.	1907.
All communicable diseases,	88,320	70,864
Actinomycosis,	1	2
Anthrax,	23	26
Cerebro-Spinal Meningitis,	361	430
Chicken Pox,	2,999	3,442
Diphtheria,	10,870	10,510
Epidemic Dysentery,	5	3
Erysipelas,	1,010	972
German Measles,	404	100
Rabies,	8	5
Malarial Fever,	99	81
Measles,	23,729	11,776
Mumps,	1,337	1,115
Pneumonia,	6,169	5,282
Puerperal Fever,	77	57
Scarlet Fever,	7,670	7,699
Small-Pox,	73	62
Tetanus,	65	74
Trachoma,	23	26
Trichiniasis,	1	0
Tuberculosis,	5,234	6,109
Typhoid Fever,	24,471	20,080
Whooping Cough,	3,691	3,013

MORBIDITY TABLE NO. 1.

Number of cases of communicable diseases reported from the entire State and urban and rural districts by months:

Month.	Total.	Urban.	Rural.
Total,	70,864	60,448	10,416
January,	7,660	6,887	773
February,	5,958	5,291	667
March,	5,242	4,673	569
April,	5,253	4,641	612
May,	5,688	5,096	592
June,	5,528	4,999	529
July,	4,042	3,548	494
August,	4,175	3,740	435
September,	4,429	3,830	599
October,	5,971	4,688	1,283
November,	8,022	6,149	1,873
December,	8,896	6,906	1,990

MORBIDITY TABLE NO. 2.

Rates per 100,000 of population of all communicable diseases for the entire State and urban and rural districts by months:

Month.	State Rate.	Urban.	Rural.
January,	108.9	195.9	32.4
February,	84.7	113.8	27.9
March,	74.5	105.2	23.8
April,	74.5	105.0	24.0
May,	80.8	109.6	24.8
June,	78.6	107.5	23.6
July,	57.4	78.4	20.7
August,	59.4	80.5	18.2
September,	62.9	82.6	24.9
October,	84.9	105.3	53.4
November,	112.6	132.2	78.6
December,	126.5	148.5	83.4

MORBIDITY TABLE NO. 3.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All communcable diseases, entire State,	Totals,	70,864	7,660	5,958	5,242	5,253	5,688	5,528	4,042	4,175	4,429	5,971	8,022	8,896
	Urban,	60,448	6,887	5,291	4,673	4,641	5,096	4,999	3,543	3,740	3,830	4,688	6,149	6,906
	Rural,	10,416	773	667	569	612	592	529	494	435	599	1,283	1,873	1,990
Actinomycosis,	Total,	2	0	0	0	0	1	0	0	1	0	0	0	0
	Urban,	2	0	0	0	0	1	0	0	1	0	0	0	0
	Rural,	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthrax,	Total,	26	4	3	4	3	1	1	0	1	0	0	9	0
	Urban,	21	4	2	4	3	1	1	0	1	0	0	5	0
	Rural,	5	0	1	0	0	0	0	0	0	0	0	4	0
Cerebro-Spinal Meningitis,	Total,	430	16	15	71	126	71	40	11	20	15	18	11	16
	Urban,	394	14	14	68	122	66	37	10	17	12	14	9	11
	Rural,	36	2	1	3	4	5	3	1	3	3	4	2	5
Chicken Pox,	Total,	3,442	453	352	344	263	354	246	102	29	38	138	481	642
	Urban,	3,001	420	320	325	240	333	236	97	26	33	115	371	485
	Rural,	441	33	32	19	23	21	10	5	3	5	23	110	157
Diphtheria,	Total,	10,510	1,095	823	769	737	575	553	473	597	796	1,283	1,501	1,303
	Urban,	8,656	920	731	653	624	496	499	388	484	665	998	1,196	1,002
	Rural,	1,854	175	97	116	113	79	54	85	113	131	285	305	301
Epidemic Dysentery,	Total,	3	0	0	0	0	0	0	0	0	1	0	2	0
	Urban,	2	0	0	0	0	0	0	0	0	0	0	2	0
	Rural,	1	0	0	0	0	0	0	0	0	1	0	0	0
Erysipelas,	Total,	972	86	83	118	125	83	90	39	23	38	56	100	131
	Urban,	863	72	72	105	115	77	85	33	21	37	48	87	111
	Rural,	109	14	11	13	10	6	5	6	2	1	8	13	20
German Measles,	Total,	100	7	6	5	7	16	12	3	0	3	6	21	14
	Urban,	56	0	2	3	6	11	5	0	0	2	2	13	12
	Rural,	44	7	4	2	1	5	7	3	0	1	4	8	2
Rabies,	Total,	5	0	0	1	0	0	1	0	0	0	1	2	0
	Urban,	2	0	0	0	0	0	0	0	0	0	0	2	0
	Rural,	3	0	0	1	0	0	1	0	0	0	1	0	0
Malarial Fever,	Total,	81	6	3	8	3	5	4	5	4	11	18	10	4
	Urban,	71	6	3	8	3	4	3	5	4	8	15	10	2
	Rural,	10	0	0	0	0	1	1	0	0	3	3	0	2

MORBIDITY TABLE NO. 3.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Measles,	Total,	11,776	482	421	550	964	1,603	1,872	906	314	163	640	1,554	2,307
	Urban,	8,951	355	307	466	818	1,357	1,592	752	274	124	352	1,000	1,553
	Rural,	2,825	127	114	84	146	246	280	153	40	39	288	554	754
Mumps,	Total,	1,115	108	78	85	87	130	119	69	26	16	48	162	187
	Urban,	872	99	74	80	82	118	111	46	17	11	39	62	133
	Rural,	243	9	4	5	5	12	8	23	9	5	9	100	54
Pneumonia,	Total,	5,282	768	584	710	494	457	307	136	123	143	240	514	806
	Urban,	4,877	699	522	656	458	423	293	131	117	138	229	467	749
	Rural,	405	69	62	54	36	29	14	5	6	5	11	47	67
Puerperal Fever,	Total,	57	12	2	7	9	3	1	1	2	3	2	12	3
	Urban,	43	10	2	6	6	2	1	0	1	3	2	8	2
	Rural,	14	2	0	1	3	1	0	1	1	0	0	4	1
Scarlet Fever,	Total,	7,699	713	572	676	577	479	495	379	414	528	715	1,085	1,066
	Urban,	6,132	579	450	527	425	391	435	326	362	468	577	832	760
	Rural,	1,567	134	122	149	152	88	60	53	52	60	138	253	306
Small Pox,	Total,	62	7	4	9	7	3	6	14	4	1	2	1	4
	Urban,	29	1	2	2	1	3	6	3	3	1	2	1	4
	Rural,	33	6	2	7	6	0	0	11	1	0	0	0	0
Tetanus,	Total,	74	2	7	7	4	8	6	8	10	6	9	5	2
	Urban,	63	2	7	3	3	8	6	8	8	6	7	3	2
	Rural,	11	0	0	4	1	0	0	0	2	0	2	2	0
Trachoma,	Total,	26	2	1	1	2	1	0	2	3	0	8	3	3
	Urban,	18	2	1	1	2	1	0	1	3	0	1	3	3
	Rural,	8	0	0	0	0	0	0	1	0	0	7	0	0
Tuberculosis,	Total,	6,109	546	530	477	450	587	477	475	512	482	478	476	619
	Urban,	5,867	525	504	457	429	569	459	466	491	470	467	451	579
	Rural,	242	21	26	20	21	18	18	9	21	12	11	25	40
Typhoid Fever,	Total,	20,080	3,099	2,206	1,178	1,126	999	1,045	1,092	1,849	1,967	2,123	1,830	1,566
	Urban,	18,067	2,978	2,099	1,107	1,067	961	986	996	1,684	1,671	1,673	1,487	1,358
	Rural,	2,013	121	107	71	59	38	59	96	165	296	450	343	208
Whooping Cough,	Total,	3,013	254	263	222	269	312	253	327	243	218	186	243	223
	Urban,	2,461	201	179	202	237	269	244	285	226	181	147	140	150
	Rural,	552	53	84	20	32	43	9	42	17	37	39	103	73

TYPHOID FEVER.

A total of 20,080 cases of typhoid fever were reported during the year. Of this number 18,067 were reported from urban districts and 2,013 from rural districts. The greatest number of cases reported in any single month was 3,099 in January, for which the Scranton epidemic was responsible, the beginning influence of which was noted in the returns of typhoid fever for the month of December, 1906. Typhoid fever in the rural districts shows the same tendency to increase in the autumnal months as it did in 1906. The increase, however, extended through the month of December. 54.1 per cent. of all cases of rural typhoid fever occurred during the months of September, October and November.

MORBIDITY TABLE NO. 4.

Typhoid Fever by Months, Urban and Rural, Compared with 1906.

	Total.		Urban.		Rural.	
	1906.	1907.	1906.	1907.	1906.	1907.
Entire year,	24,471	20,080	22,520	18,067	1,951	2,013
January,	2,177	3,099	2,009	2,978	158	121
February,	2,286	2,206	2,172	2,099	114	107
March,	1,870	1,178	1,751	1,107	119	71
April,	2,122	1,126	2,031	1,067	91	59
May,	1,829	999	1,720	961	109	38
June,	1,198	1,045	1,128	986	70	59
July,	1,404	1,092	1,294	996	110	96
August,	2,026	1,849	855	1,684	171	165
September,	2,342	1,967	1,991	1,671	251	296
October,	2,396	2,123	2,033	1,673	363	450
November,	1,894	1,830	1,705	1,487	189	343
December,	2,927	1,566	2,831	1,358	96	208

MORBIDITY TABLE NO. 5.

Distribution of typhoid fever according to age periods for entire State, urban and rural districts by percentage to total cases in each locality.

	State.	Urban.	Rural.
Under 5 years,	4.5	4.5	4.0
5 to 9 years,	12.2	12.3	11.5
10 to 14 years,	12.9	12.8	13.4
15 to 19 years,	16.0	15.7	18.6
20 to 24 years,	18.2	18.3	17.6
25 to 29 years,	13.6	13.9	11.2
30 to 34 years,	8.1	8.3	7.1
35 to 39 years,	5.4	5.4	5.5
40 to 44 years,	3.6	3.6	3.6
45 to 49 years,	2.3	2.2	3.1
Over 50 years,	3.2	3.0	4.4

MORBIDITY TABLE NO. 6.

Typhoid Fever by Nativity and Age Periods.

	All ages.	0-4.	5-9.	10-19.	20-29.	30-39.	40-49.	50-59.	60-69.	70.	Un.
Native,	14,957	789	2,153	4,626	3,986	1,780	818	306	108	45	346
Foreign,	4,412	68	172	836	2,014	770	239	96	32	11	124
Unknown,	711	24	55	146	172	79	35	7	7	0	186

MORBIDITY NO. 7.

Typhoid Fever by Color and Age Periods.

	All ages.	0-4.	5-9.	10-19.	20-29.	30-39.	40-49.	50-59.	60-69.	70.	Un.
White,	19,065	814	2,258	5,375	5,875	2,513	1,112	403	147	54	514
Black,	875	67	122	231	290	116	30	6	0	2	11
Color unstated,	140	.....	.....	2	7	.....	.....	.....	.....	.....	131

MORBIDITY TABLE NO. 8.

Typhoid Fever by Sex and Color.

	All colors.	White.	Black.	Unstated colors.
Total,	20,080	19,065	875	140
Males,	11,641	11,156	476	9
Females,	8,314	7,909	399	6
Sex unstated,	125	.....	.....	125

DIPHTHERIA.

10,510 cases of diphtheria were reported during the year, a decrease of 360 cases as compared with the previous year.

MORBIDITY TABLE NO. 10.

Diphtheria by Months, Urban and Rural, as Compared with 1906.

	Total.		Urban.		Rural.	
	1906.	1907.	1906.	1907.	1906.	1907.
Entire year,	10,870	10,510	8,956	8,656	1,914	1,854
January,	1,042	1,095	824	920	218	175
February,	885	828	706	731	179	97
March,	852	769	701	653	151	116
April,	703	737	576	624	127	113
May,	688	575	584	496	104	79
June,	546	553	470	499	76	54
July,	437	473	366	388	71	85
August,	461	597	402	484	59	113
September,	994	796	826	665	168	131
October,	1,589	1,283	1,270	998	319	285
November,	1,458	1,501	1,190	1,196	268	306
December,	1,215	1,303	1,041	1,002	174	301

MORBIDITY TABLE NO. 11.

Distribution of Diphtheria according to age periods for entire State, urban and rural districts by percentages to total cases in each locality.

	State.	Urban.	Rural.
Under 5 years,	33.0	34.7	25.4
5 to 9 years,	37.1	37.2	35.5
10 to 14 years,	14.4	13.6	17.8
15 to 19 years,	5.4	4.8	8.4
20 to 24 years,	3.4	3.2	4.2
25 to 29 years,	2.5	2.5	2.5
30 to 34 years,	2.0	1.8	2.7
35 to 39 years,	0.9	1.0	0.8
40 years and over,	1.3	1.2	2.7

MORBIDITY TABLE NO. 12.

Diphtheria by Nativity and Age Periods.

	All ages.	0-4.	5-9.	10-19.	20-29.	30-39.	40-49.	50-59.	60-69.	70.	Un.
Native,	9,228	2,964	3,448	1,840	512	250	69	24	6	3	106
Foreign,	796	326	215	115	67	35	17	2	3	0	15
Unknown,	487	109	154	74	23	16	8	0	3	2	98

MORBIDITY TABLE NO. 13.

Diphtheria by Color and Age Periods.

	All ages.	0-4.	5-9.	10-19.	20-29.	30-39.	40-49.	50-59.	60-69.	70.	Un.
White,	10,263	3,335	3,760	1,989	583	292	93	25	11	5	170
Black,	183	58	50	39	25	8	1	1	1	0	0
Color unstated,	64	6	6	1	.....	1	.....	.....	.....	.....	50

MORBIDITY TABLE NO. 14.

Diphtheria by Sex and Color.

	All colors.	White.	Black.	Color unstated.
Total,	10,510	10,263	183	64
Males,	5,015	4,895	86	34
Females,	5,495	5,368	97	30

SCARLET FEVER.

7,699 cases of scarlet fever were reported during the year, an increase of 29 as compared with the previous year.

MORBIDITY TABLE NO. 15.

Scarlet Fever by Months, Urban and Rural, compared with 1906.

	Total.		Urban.		Rural.	
	1906.	1907.	1906.	1907.	1906.	1907.
Entire year,	7,670	7,697	6,107	6,132	1,563	1,567
January,	879	713	652	579	227	134
February,	875	572	677	450	198	122
March,	758	676	560	527	198	149
April,	687	577	529	425	158	152
May,	701	479	582	391	119	88
June,	517	495	447	435	70	60
July,	378	379	328	326	50	53
August,	350	414	302	362	48	52
September,	425	528	332	468	93	60
October,	679	715	549	577	139	138
November,	687	1,085	558	832	129	253
December,	734	1,066	591	760	143	306

MORBIDITY TABLE NO. 16.

Distribution of scarlet fever according to age periods, State, urban and rural by percentage to total cases in each locality.

Age.	State.	Urban.	Rural.
Under 5 years,	28.7	29.2	26.8
5 to 9 years,	42.9	43.4	40.7
10 to 14 years,	18.4	17.6	22.0
15 to 19 years,	5.0	4.8	5.8
20 to 24 years,	2.4	2.6	1.7
25 to 29 years,	1.2	1.2	1.2
30 to 35 years,	0.7	0.6	1.0
35 to 39 years,	0.3	0.3	0.3
40 years and over,	0.4	0.3	0.5

MORBIDITY TABLE NO. 17.

Scarlet Fever by Nativity and Age Periods.

	All ages.	0-4.	5-9.	10-19.	20-29.	30-39.	40-49.	50-59.	60-69.	70.	Un.
Native,	6,828	1,910	2,907	1,623	227	56	17	2	.....	.....	86
Foreign,	608	206	240	104	41	7	.....	.....	.....	.....	6
Unknown,	263	58	100	48	9	6	4	.....	.....	.....	38

MORBIDITY TABLE NO. 18.

Scarlet Fever by Color and Age Periods.

	All ages.	0-4.	5-9.	10-19.	20-29.	30-39.	40-49.	50-59.	60-69.	70.	Un.
White,	7,625	2,156	3,222	1,763	275	67	25	2	.....	.....	115
Black,	53	16	23	11	2	1	.....	.....	.....	.....	.....
Color unstated,	21	2	2	1	.....	1	.....	.....	.....	.....	15

MORBIDITY TABLE NO. 19.

Scarlet Fever by Sex and Color.

	All colors.	White.	Black.	Color unstated.
Total,	7,699	7,625	53	21
Males,	3,612	3,573	25	14
Females,	4,087	4,052	28	7

TUBERCULOSIS.

In comparison with the deaths, reports of tuberculosis continue to be very incomplete. A total of 6,109 were received during the year, an increase of 875 as compared with the preceding year.

MORBIDITY TABLE NO. 20.

Tuberculosis by Months, State, Urban and Rural.

	State total.	Urban	Rural.
Entire year,	6,109	5,967	242
January,	546	525	21
February,	530	504	26
March,	477	457	20
April,	450	429	21
May,	587	569	18
June,	477	459	18
July,	475	466	9
August,	512	491	21
September,	482	470	12
October,	478	467	11
November,	476	451	25
December,	619	579	40

Distribution of tuberculosis according to age periods, State, urban and rural by percentage to total cases in each locality.

	State.	Urban.	Rural.
Under 5 years,	2.8	2.8	2.9
5 to 9 years,	1.4	1.4	1.6
10 to 14 years,	1.7	1.8	1.6
15 to 19 years,	8.2	8.1	11.2
20 to 24 years,	15.1	14.8	19.6
25 to 29 years,	15.8	15.7	18.0
30 to 34 years,	13.4	13.7	11.0
35 to 39 years,	13.7	13.0	14.2
40 to 44 years,	8.7	9.1	4.0
45 to 49 years,	6.1	6.4	4.0
50 to 54 years,	5.2	5.3	4.2
55 to 59 years,	2.8	2.9	0.8
60 to 64 years,	2.4	2.3	4.0
65 years and over,	2.7	2.7	2.9

Distribution of Tuberculosis by Nativity and Age Periods.

	All ages.	0-4.	5-9.	10-19.	20-29.	30-39.	40-49.	50-59.	60-69.	70.	Un.
Native, ...	3,930	146	67	453	1,216	1,014	522	269	115	38	90
Foreign, ...	1,387	6	8	85	402	375	268	136	58	28	21
Unknown, ...	702	13	6	48	178	166	97	70	37	8	79

Distribution of Tuberculosis by Color and Age Periods.

	All ages.	0-4.	5-9.	10-19.	20-29.	30-39.	40-49.	50-59.	60-69.	70.	Un.
White, ...	5,488	133	66	513	1,645	1,427	819	440	199	71	170
Black, ...	475	24	14	66	140	114	64	29	11	2	11
Color unstated, ...	56	3	1	7	11	14	4	6	0	1	9

Tuberculosis by Sex and Color.

	All colors.	White.	Black.	Color unstated.
Total, ...	6,019	5,488	475	56
Males, ...	3,454	3,164	260	30
Females, ...	2,565	2,324	215	26

The Sub-Division of Marriage Statistics

In Charge of WILMER R. BATT, M. D., Registrar.

MARRIAGES.

60,243 marriages were recorded during the year, an increase of 916 as compared with 1906. The number of persons married per 1,000 of population was 17.1. This rate is identical with the previous year and the intensity of the marriage movement, as measured by the number of persons married in proportion to those capable of contracting marriage, remains practically unchanged.

One male in every 15.8 of unmarried males of marriageable age contracted marriage, and among females one in every 12.4. The average age at which marriage was contracted shows a slight increase over the previous year, being for brides 24.7 years and for grooms 27 years.

Probably no other single factor plays so important a part in the decline of the birth rate as the increasing age at which marriage is contracted. This condition prevails to a greater extent among the native population than it does among the foreign born.

Of the native brides, 63.6 per cent. were less than 25 years of age while the percentage for the same age of the foreign brides was 74.9.

Of the total, there were among brides 55,488 first marriages, 4,665 second marriage, 86 third marriages and 4 fourth marriages.

Among the grooms there were 54,476 first marriages, 5,597 second marriages, 159 third marriages, 10 fourth marriages and 1 fifth marriage.

Of the 4,775 second or more marriages among brides, 3,679 had been previously widowed and 1,076 divorced. Among grooms, 4,856 had been widowered and 911 divorced.

Table 1 shows the number of marriages in each county of the State by months with totals for the entire State.

Table 2 shows the marriage rate for each county in the State.

Table 3 shows the ages of brides and grooms with nativity.

Table 4 shows the percentage of brides and grooms by age periods.

Table 5 shows the percentage of marriages by months.

Table 6 shows the number of marriages by age periods for brides and grooms.

TABLE 1.—MARRIAGES.

Area.	Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Total,	60,243	4,249	4,088	3,207	5,384	4,366	8,091	4,278	4,550	5,737	6,078	5,777	4,438
Adams,	215	19	13	19	17	17	18	15	19	20	23	17	18
Allegheny,	9,676	727	715	386	830	816	1,338	720	763	946	996	898	532
Armstrong,	477	35	27	29	47	27	64	32	47	40	37	46	46
Beaver,	610	35	34	36	57	36	89	63	40	54	65	55	46
Bedford,	270	22	23	23	24	9	26	15	22	25	27	25	29
Blair,	996	62	78	40	84	74	137	68	87	91	109	92	74
Bradford,	315	21	17	26	22	19	36	19	35	26	40	26	28
Berks,	1,641	100	106	137	131	139	200	112	135	123	141	180	137
Bucks,	424	43	23	30	30	27	63	18	27	30	34	48	51
Butler,	616	34	47	18	54	48	90	53	56	68	61	44	43
Cambria,	1,414	99	98	71	124	129	162	108	118	127	155	144	79
Cameron,	55	4	.....	1	4	3	6	5	6	8	11	3	4
Carbon,	426	17	36	22	34	41	44	37	32	36	40	47	40
Centre,	327	28	19	21	33	24	30	26	31	26	31	47	31
Chester,	689	44	55	58	67	46	79	27	59	57	75	73	48
Clarion,	215	6	10	14	15	23	28	13	15	21	27	20	23
Clearfield,	703	53	42	25	45	73	108	60	47	61	78	50	61
Clinton,	225	8	16	24	22	14	30	17	15	26	19	21	23
Columbia,	349	19	19	36	34	18	45	20	28	26	28	41	35
Crawford,	429	23	29	34	31	25	60	28	34	65	35	32	33
Cumberland,	401	35	34	38	40	23	41	25	22	32	40	33	38
Dauphin,	1,426	89	102	105	112	108	188	98	87	133	141	135	128
Delaware,	812	41	57	34	83	42	124	49	61	78	102	84	57
Elk,	231	11	13	13	24	24	22	14	18	25	22	20	15
Erie,	763	53	44	38	67	55	123	55	54	99	57	75	43
Fayette,	1,217	93	105	53	99	107	138	106	104	96	108	107	101
Forest,	55	7	2	1	6	3	5	6	2	4	5	5	9
Franklin,	386	34	24	29	29	23	45	17	28	45	43	32	37
Fulton,	57	4	6	4	4	7	3	1	3	5	7	4	9
Greene,	200	9	18	10	15	16	21	8	24	23	15	20	21
Huntingdon,	309	16	22	29	20	25	33	19	24	34	29	26	32
Indiana,	476	21	38	22	38	30	39	46	49	50	49	48	46
Jefferson,	480	26	33	26	36	38	58	52	31	41	45	37	57
Juniata,	142	8	5	9	16	11	15	9	13	15	15	7	19
Lackawanna,	1,981	122	124	66	176	149	272	146	168	246	218	210	84

Lancaster,	1,321	84	86	121	117	66	133	81	66	117	136	174	135
Lawrence,	590	37	30	36	47	50	72	61	42	68	45	55	47
Lebanon,	498	29	33	51	32	40	59	35	29	40	49	55	46
Lehigh,	1,376	113	103	96	108	107	162	86	106	124	131	135	105
Luzerne,	2,122	215	45	67	178	144	342	201	122	214	234	234	126
Lycoming,	548	32	39	56	48	35	61	48	34	49	55	43	48
McKean,	212	13	14	6	17	14	28	17	15	28	22	18	20
Mercer,	574	63	44	28	45	37	83	40	27	75	49	36	47
Mifflin,	264	19	24	35	23	19	27	13	27	13	21	12	31
Monroe,	157	13	10	14	11	10	20	7	12	12	23	14	11
Montgomery,	1,064	74	60	46	121	63	168	68	53	98	108	111	94
Montour,	109	3	4	9	8	1	16	3	8	13	15	10	19
Northampton,	1,135	106	86	59	104	71	115	84	77	117	120	120	76
Northumberland,	857	67	59	43	58	62	107	59	78	95	84	76	69
Perry,	153	7	10	11	17	17	14	10	7	10	10	16	24
Philadelphia,	12,712	841	900	586	1,372	780	1,973	792	919	1,103	1,313	1,261	872
Pike,	30	0	1	3	1	2	2	1	2	6	2	3	7
Potter,	108	5	5	4	9	6	10	9	9	11	18	11	11
Schuylkill,	1,658	128	130	69	141	113	223	110	153	188	151	149	103
Snyder,	152	17	6	12	19	7	15	8	9	11	9	16	23
Somerset,	510	52	34	28	36	38	57	36	39	36	54	51	49
Sullivan,	57	6	0	4	7	6	10	7	5	3	2	4	3
Susquehanna,	260	23	17	13	21	15	31	17	23	33	27	27	13
Tioga,	191	7	9	12	11	6	21	13	22	25	26	18	21
Union,	138	7	12	17	9	2	19	9	11	11	11	10	20
Venango,	429	33	22	13	40	26	69	33	27	35	52	41	38
Warren,	200	10	12	11	20	15	34	23	17	21	13	12	12
Washington,	957	68	64	47	80	112	98	69	80	94	88	82	75
Wayne,	136	9	3	4	10	1	19	7	7	17	30	15	14
Westmoreland,	1,588	122	110	74	119	177	180	137	139	166	153	137	85
Wyoming,	95	10	8	3	4	4	14	8	9	8	8	9	10
York,	1,024	68	74	102	81	62	114	60	81	94	91	90	107

TABLE 2.

Number of Persons Married to Each 1,000 of Population for Each County.

Adams,	12.2	Lackawanna,	17.3
Allegheny,	22.1	Lancaster,	15.9
Armstrong,	16.9	Lawrence,	16.9
Beaver,	20.1	Lebanon,	17.3
Bedford,	13.5	Lehigh,	27.2
Berks,	18.7	Luzerne,	14.5
Blair,	21.1	Lycoming,	13.8
Bradford,	10.6	McKean,	7.8
Bucks,	11.8	Mercer,	19.6
Butler,	21.2	Mifflin,	20.9
Cambria,	22.5	Monroe,	14.4
Cameron,	15.6	Montgomery,	14.3
Carbon,	15.2	Montour,	14.0
Centre,	15.2	Northampton,	19.9
Chester,	13.8	Northumberland,	16.9
Clarion,	12.7	Perry,	15.5
Clearfield,	15.8	Philadelphia,	17.5
Clinton,	15.9	Pike,	6.8
Columbia,	16.7	Potter,	6.0
Crawford,	13.5	Schuylkill,	17.9
Cumberland,	15.3	Snyder,	17.6
Dauphin,	22.7	Somerset,	17.8
Delaware,	15.2	Sullivan,	9.1
Elk,	11.1	Susquehanna,	13.0
Erie,	14.3	Tioga,	7.8
Fayette,	18.7	Union,	15.7
Forest,	8.7	Venango,	16.6
Franklin,	13.3	Warren,	10.0
Fulton,	10.5	Washington,	18.0
Greene,	14.1	Wayne,	9.0
Huntingdon,	17.8	Westmoreland,	16.6
Indiana,	22.2	Wyoming,	10.6
Jefferson,	13.9	York,	16.0
Juniata,	17.7	Entire State,	17.0

TABLE 3.

Marriages by Nativity and Ages of Brides and Grooms.

Ages.	Brides.				Grooms.			
	Aggregate.	Native.	Foreign.	Nativity unstated.	Aggregate.	Native.	Foreign.	Nativity unstated.
Under 15,	75	43	17	15	2	1	1	.....
15-19,	11,567	7,355	1,756	2,456	1,949	1,447	66	436
20-24,	30,256	16,139	9,327	4,790	25,653	14,263	6,833	4,557
25-29,	10,291	6,616	2,127	1,548	18,283	9,418	6,020	2,845
30-34,	3,776	2,535	691	550	6,758	4,063	1,697	998
35-39,	2,024	1,289	424	311	3,297	2,026	786	485
40-44,	993	599	239	155	1,643	993	401	249
45-49,	605	384	125	96	1,155	708	276	171
50-54,	352	211	55	86	628	351	140	137
55-59,	168	96	37	35	397	227	92	78
60-64,	84	47	19	18	252	148	46	58
65-69,	36	21	7	8	143	89	29	25
70-74,	11	7	2	2	58	45	7	6
75+,	4	3	1	.....	22	11	2	9
Age unstated,	1	.....	1	.....	3	3	.....	.....
Total,	60,243	35,345	14,828	10,070	60,243	33,793	16,396	10,054

TABLE 4.

The Percentages of Brides and Grooms in Each Age Period to Total Brides and Grooms.

	Brides.	Grooms.
Under 15,	0.13	0.03
15 to 19 years,	19.2	3.2
20 to 24 years,	50.2	42.6
25 to 29 years,	17.0	30.3
30 to 34 years,	6.3	11.2
35 to 39 years,	3.4	5.5
40 to 44 years,	1.7	2.7
45 to 49 years,	1.0	1.9
Over 50 years,	1.1	2.6

TABLE 5.

The Percentage of Marriages in Each Month of the Year to Total Marriages.

January,	7.1	July,	7.1
February,	6.8	August,	7.5
March,	5.3	September,	9.6
April,	8.9	October,	10.1
May,	7.2	November,	9.6
June,	13.4	December,	7.4

TABLE 6.

The Number of Marriage by Age Periods for Brides and Grooms.

Ages.	Brides.					Grooms.					
	Aggregate.	1st.	2nd.	3rd.	4th.	Aggregate.	1st.	2nd.	3rd.	4th.	5th.
Aggregate,	60,243	55,488	4,665	86	4	60,243	54,476	5,597	159	10	1
Under 15,	75	75	.....	.....	.....	2	2	.....	.....	.....	.....
15-19,	11,567	11,527	39	1	.....	1,949	1,949	.....	.....	.....	.....
20-24,	30,256	29,759	495	2	.....	25,652	25,482	170	.....	.....	.....
25-29,	10,291	9,375	908	8	.....	18,283	17,621	660	2	.....	.....
30-34,	3,776	2,869	900	7	.....	6,758	5,763	983	12	.....	.....
35-39,	2,024	1,139	875	10	.....	3,297	2,273	1,010	14	.....	.....
40-44,	983	401	579	13	.....	1,643	779	845	18	1	.....
45-49,	605	197	395	13	.....	1,155	418	710	24	3	.....
50-54,	352	90	247	13	2	628	111	490	26	.....	1
55-59,	168	28	127	13	.....	397	44	324	28	1	.....
60-64,	84	18	61	4	1	252	19	216	15	2	.....
65-69,	36	9	25	2	.....	143	9	119	14	1	.....
70-74,	11	.....	11	.....	.....	58	3	50	5	.....	.....
75+,	4	.....	3	.....	1	23	.....	20	1	2	.....
Age unstated,	1	.....	.....	.....	.....	3	3	.....	.....	.....	.....

The Division of Distribution of Biological Products

HENRY W. PEIRSON, Chief.

23—16—1907

MAP SHOWING DEPOTS FOR
FREE DISTRIBUTION
OF
DIPHTHERIA ANTITOXIN
PENNSYLVANIA DEPT OF HEALTH

THE DIVISION OF DISTRIBUTION OF BIOLOGICAL PRODUCTS.

DIPHTHERIA ANTITOXIN.

The total number of cases treated among the indigent throughout the entire State during the year 1907 was 5,271, of which number only 376 resulted fatally, showing the remarkably low death rate of 7.13 per cent., a decrease over the year 1906, of exactly 4 per cent.

A comparison of results obtained for the year 1906 and 1907 will be found in the "Summary of Observations upon the Use of Diphtheria Antitoxin for the year 1907," on page 367 of this report and much interesting information in detail taken from the clinical reports received from physicians, will be found in the tables beginning on page 370.

The distribution of Antitoxin to the indigent of the State by the Department of Health began in October, 1905, but the establishment of distributing stations and the appointment of distributors did not take place until November 4, 1905, when 473 distributors were appointed at convenient points in every county in the State, outside of the cities of Philadelphia and Pittsburg; most of them being duly registered druggists with the exception of a few physicians appointed at places where no drug stores were located.

The number of stations was increased as the actual need for same, after careful investigation, became apparent to the Department, and at the end of December, 1906, numbered 511, an increase of 38 in a little over fourteen months' time.

The demand for additional distributing stations during the year 1907 became so imperative that the Commissioner of Health felt it his duty to increase the number already established, and December 31, 1907, found us with a total of 529 distributing stations, an increase of 18 over the year 1906. It must be borne in mind, however, that all of these 529 distributing stations are not active at any one time, though such, of course, might be the case.

In this connection it might be well to state that, notwithstanding, the additional number of distributors appointed during 1907, there are on file in the Department over one hundred written communications recommending additional distributing stations at various

points throughout the State, some of which, at least, the Commissioner of Health hopes to see his way clear to grant in the near future.

A glance at the map to the left will give the reader a fair idea as to the locations of the distributing stations now existing and the accompanying list gives the names of the distributors appointed to December 31, 1907.

DISTRIBUTORS OF DIPHTHERIA ANTITOXIN APPOINTED BY THE COMMISSIONER OF HEALTH.

Antitoxin either for curative or immunizing purposes and in appropriate doses may be secured by physicians practicing in this Commonwealth upon their agreeing in writing that no charge of any kind is to be made for the Antitoxin, and that the person or persons for whom it is obtained are indigent in the sense that they cannot procure the necessities of life and at the same time purchase Antitoxin, and also that the physician will send to the Department of Health a full clinical report as specified by the Commissioner of Health.

ADAMS COUNTY.

Auker, Edward T., New Oxford.
Buehler, L. M., Gettysburg.
Cashman, Elmer W., York Springs.
Kemp, Dr. J. S., Littlestown.
Stover, Dr. J. G., Bendersville.
Trout, Dr. N. G., Fairfield.
Wolf, Charles S., East Berlin.
Wolff, W. E., Arendtsville.

ALLEGHENY COUNTY.

Burns, H. W., Coraopolis.
Covell, S. W., Wilkinsburg.
Doyle, J. J., Castle Shannon.
Forsythe, Geo. W., Natrona.
Goldsmith's Pharmacy, Tarentum.
Haymaker, Milo M. & Co., Pitcairn.
Hollander, Jos. M., Braddock.
Kelley & Havekotte, Sharpsburg.
Itel, Albert I., McKees Rocks.
McClaren's Pharmacy, Glassport.
Paules, J. L., Homestead.
Shaffer, P. T. B., Elizabeth.
Sprowl's Pharmacy, Turtle Creek.
Swearingen, W. H., Bellevue.
Thompson, Harry M., Carnegie.
Walker's Prescription Pharmacy, McKeesport.
Whiteley, W. S., Verona.

ARMSTRONG COUNTY.

Hoover, A. M., Parker's Landing.
McClelland Bros., Ford City.
Parks, J. H., Leechburg.
Sharp & Borland, Dayton.
Sturgeon, W. J., Kittanning.
Wray, Frank T., Apollo.

BEAVER COUNTY.

Aber, O. E., Industry.
Bebout, W. I., Darlington.
Fitzgerald, Thos., Ambridge.
Hoffman, W. A., Beaver Falls, Beaver.
Kaye, Walter D., Monaca.
Neubig, Chas. J., Rochester.
Pugh, Frank S., Hookstown.
Schweppe, H. L., New Brighton.

BEDFORD COUNTY.

Alexander, W. A., Everett.
Grubb & Weimer, Clearville.
Jordan, F. W., Bedford.
Rhodes, C. R., Hyndman.
Saxton Drug Store, Saxton.
Shaffer & Conrad, Osterburg.
Stayer, Irvin C., Woodbury.
Tewell, A. L., Chaneysville.
Zeth, Jno. L., Hopewell.

BERKS COUNTY.

Hoffman, Nicholas J., Birdsboro.
Landis, F. T., Womelsdorf.
Mayer, Irene F., Boyertown.
Raser, Wm. H., Reading.
Schomo, Chas. C., Hamburg.
Sellers, E. J., Kutztown.
Werley, Charles D., Topton.

BLAIR COUNTY.

Boecking, G. C., Tyrone.
Boecking & Meredith, Bellwood.
Boecking & Meredith, Altoona.
Butler, John P., Altoona.
Davis, H. I., Hollidaysburg.
Hair, Edward, Roaring Spring.
Hess, I. C., Duncansville.
Ketring, D. T., Williamsburg.
Sanders, J. C., Martinsburg.

BRADFORD COUNTY.

Allis, I. M., Wyalusing.
Billings, F. T. & Son, Le Raysville.
Carpenter & Pierce, Troy.
Francke, E. O., Athens.
Jump, H. D., Sayre.
Laquin Lumber Co., Laquin.
Lomax, F. F., Monroeton.
Passmore, John E., Gillett.
Porter, Dr. H. C. & Son, Towanda.
Whitman, W. W., Canton.
Wilcox, Ray S., New Albany.

BUCKS COUNTY.

Hellyer, E. F., Newtown.
Hulshizer, Est. of Martin, Doylestown.
Johnson, Dr. H. W., Riegelsville.
Moyer, Howard R., Quakertown.
Pryor, Frank C., Morrisville.
Pryor, William B. T., Langhorne.
Pursell, Howard, Bristol.
Williams, N. B., Perkasie.
Willard, S. B., Yardley.

BUTLER COUNTY.

Edmonds, A. J., Bruin.
Hall, Amos, Branchton.
Hindman, H. C., West Sunbury.
Maybury & Pizor, Slippery Rock.
Mershon, E. B., Saxonburg.
Redick & Grohman, Butler.
Thomas, J. D., Evans City.

CAMBRIA COUNTY.

Baird, Mrs. Carrie, Dunlo.
Berry, Chas. L., Johnstown.
Davis, Cyrus W., Conemaugh.
Gunn, John A., Patton.
James, E. & Son, Ebensburg.
Keffer, W. O., Frugality.
Morris, H. A., Barnesboro.
Perley, R. P., Allendale.
Reed, K. A., Gallitzin.
Sible, L. A. & Co., Johnstown.
South Fork Pharmacy, South Fork.

CAMERON COUNTY.

Barclay Bros., Sinnemahoning.
Mitchell, Wm. H., Driftwood.
Taggert, L. T., Emporium.

CARBON COUNTY.

Albert, Howard, Lansford.
Davis, Thomas E., Summit Hill.
Gilham, S. R., Lehighton.
Hess, J. M., East Mauch Chunk.
Hess & Browell, Palmerton.
Latham, Peter H., Weatherly.
Mauch Chunk Pharmacy, Mauch Chunk.
Watkins, William R., Nesquehoning.

CENTRE COUNTY.

Green, F. Potts, Bellefonte.
Meek, H. D., State College.
Melick, W. M., Philipsburg.
Meyer, Thomas F., Millheim.
Murray, Jared D., Center Hall.
Sickel, William A., Snow Shoe.

CHESTER COUNTY.

Aiken, James, Berwyn.
Hudson, Thompson, Hopewell borough.
Hutchison, David W., E. Downington.
McCullough, C. B., Oxford.
Megilligan, Mrs. H. Y. Avondale.
Oberholtzer, L., Sons & Co., Phoenixville.
Seltzer, Chas. J., Parkesburg.
Taylor, W. C., Spring City.
Thatcher, Jesse, West Chester.
Walton, Geo. R., Malvern.
Young, W. S., Coatesville.

CLARION COUNTY.

Corbett, W. W., New Bethlehem.
Coulter, Mrs. N. S., Sligo.
Craig, J. S., St. Petersburg.
Greer, Dr. R. J., East Brady.
Hoch, W. H., New Mayville.
Kuhns, G. W., Leeper.
Mooney, John A., Curllsville.
Reid's Drug Store, Clarion.
Whitling, W. H., Knox.

CLEARFIELD COUNTY.

Currier, Dr. J., Grampian.
Davidson, T. M., Mahaffey.
Flegal, Dr. J. S., Karthaus.
Glen Richey Trading Co., Glen Richey.
McCartney, W. C., Coalport.
Miller, Dr. S. J., Madera.
Phoenix Drug Store, Houtzdale.
Quinn, J. S., Du Bois.
Read, F. B. & Co., Osceola Mills.
Shugert, H. C., Morrisdale Mines.
Spackman, Dr. J. P., Peale.
Tyler Mercantile Co., Tyler.
Winburne Pharmacy, Winburne.
Woodward & Brenner, Clearfield.
Wrigley, W. K., Curwensville.

CLINTON COUNTY.

Hillton & Heffner, Lock Haven.
McGhee, John, Beech Creek.
Mervine, Dr. Graydon D., Bitumen.
Swain Drug Co., Renovo.
Waitz, Frank, Flemington.
Valley Drug Store, Mill Hall.

COLUMBIA COUNTY.

Clewell & Currin, Berwick.
Ely, Chas. S., Millville.
Fisher, J. F., Catawissa.
Goldsworthy, John W., Centralia.
McHenry, Dr. M., Benton.
Ringler, Geo. P., Bloomsburg.

CRAWFORD COUNTY.

Easterwood, F. K., Meadville.
Fisher & Fisher, Springboro.
Lydell, James, Cambridge Springs.
Stratton, George, Linesville.
Wilkins & Kemble, Titusville.

CUMBERLAND COUNTY.

Central Drug Co., Mt. Holly Springs.
Claudy, R. B., Newville.
Eckels Bros., Mechanicsburg.
Emrick, B. F., Carlisle.
Fleming & Fleming, Shippensburg.

DAUPHIN COUNTY.

Coble, A. C., Dauphin.
Davis, T. B., Williamstown.
Felty, Wilson, Linglestown.
Gross, E. Z., Harrisburg.
Hay, John W., Harrisburg.
Killough, S. M., Hummelstown.
Kuntz, John H., West Hanover.
Peters, D. A., Steelton.
Rewalt, J. W., Middletown.
Smith, A. M. & Co., Halifax.
Steever, Charles C., Millersburg.
Stroup, N. W., Elizabethville.
Zimmerman, H. M., Derry Church.

DELAWARE COUNTY.

Cloud, Harlan, Darby.
Concordville Supply Co., Concordville.
Dalton, D. A., Upland.
Davis, Harry M., Lansdowne.
Ellis, Wardle, Media.
Grafstrom, C. J., Llanerch.
Hadley, H. C., Wayne.
Kershaw, Harry, Chester.
Rea, J. H., Chester.
Shirer, V. C., Swarthmore.

ELK COUNTY.

Amend, John, Wilcox.
Bennett's Branch Supply Co., Dent's Run.
Luhr, F. A., St. Marys.
Quinn & Smith, Johnsonburg.
Ross Drug Co., Ridgway.
Sharp, W. N., Hallton.

ERIE COUNTY.

Ames, N. F. & Co., Corry.
Andrews, W. C., Erie.
Frantz, G. A., Edinboro.
Gates, William, Union City.
Loop, G. D., Northeast.
Newman, A. C., Albion.
Smith, A. R. & Co., Girard.
Wilkins, R. B., Wattsburg.

FAYETTE COUNTY.

Bulger, H. H. & Co., Brownsville.
Dunaway, M. G., Fairchance.
Feather, G. A., Smithfield.
Huston, Frank, Connellsville.
Oglevee, F. E., Vanderbilt.
Rathmell Bros., Cadwallader.
Springer, R. E., Uniontown.
Steele Pharmacy, Fayette City.
Sterling, Jesse A., Masontown.
Stouffer, Jas. C., Dawson.

FOREST COUNTY.

Detar, C. Y., Kellettville.
Dunn, J. C., Tionesta.
Fehlman, L. A., West Hickory.
Mayburg Supply Co., Mayburg.
Neill, A. D., Marienville.
Ingersoll, J. E., Lynch.

FRANKLIN COUNTY.

Carl, Chas. B., Greencastle.
Krebs, Harry B., Mercersburg.
Miller, D. L., Waynesboro.
Montgomery, J. C., Chambersburg.
Skinner, H. W., Chambersburg.

FULTON COUNTY.

Barton, C. J., Hustontown.
Cunningham, N. G., New Greneda.
Dickson, W. S., McConnellsburg.

GREENE COUNTY.

Gibbons, Dr. A. J., Carmichaels.
Hatfield, G. W., Mt. Morris.
Ullom & Bailey, Waynesburg.

HUNTINGDON COUNTY.

Grove, Harry R., Alexandria.
James, G. W. C., Orbisonia.
Minnick, J. M., Mount Union.
McClain, Jesse O., Robertsdale.
Steel, H. E., Huntingdon.
Wolfe, D. R., Birmingham.
Wright, Geo. W., Mapleton Depot.

INDIANA COUNTY.

Allison, Elmer W., Indiana.
Conner, Jno. B., Glen Campbell.
Fisher, James, Rossiter.
Goodlin, Elmer E., Saltsburg.
McCullough, H. L., Cookport.
Miller, M. G., Blairsville.
Park, L. N. & Son, Marion Center.
Rink, Chas. E., Shelocta.
Stephens, T. D., Penn Run.
Truby, S. H., Brush Valley.

JEFFERSON COUNTY.

Guthrie, H. F., Summerville.
Hamilton, Dr. S. S., Punxsutawney.
Henderson & Craig, Brookville.
Humphreys, G. H., Brockwayville.
Kunselman, M. J., Coolspring.
Mahoning Supply Co., Eleanor.
Miller, J. A. & Son, Hamilton.
Punxsutawney Drug Co., Punxsutawney.
Stoke & Feicht Drug Co., Reynoldsville.

JUNIATA COUNTY.

Banks, W. H. & Co., Mifflin.
Crawford, M. P., Mifflintown.
Haines, W. H., Thompsontown.
Heckerman's Drug Store, Port Royal.
McMeen, J. B., East Waterford.

LACKAWANNA COUNTY.

Bone, J. G. & Son, Dunmore.
Davis, Jos., Taylor.
Dennis, F. E., Carbondale.
Foote, M. A., Archbald.
Graves, J. M. & F. M., Jermyn.
Jenkins, Geo. W., Scranton.
Koempel, Carl, Scranton.
Tiffany, F. M., Dalton.
Watkins, C. J., Olyphant.

LANCASTER COUNTY.

Bucher, W. L., Columbia.
Dierolf, Chas. B., Elizabethtown.
Fry, H. P., Lititz.
Garber, Elmer W., Mount Joy.
McCloskey, C. E., Marietta.
Miller, J. A., Lancaster.
Quarryville Drug Co., Quarryville.
Reeder, Dr. M. T., Millersville.
Royer, G. S., Ephrata.
Ruhl, H. F., Manheim.
Weaver, J. G., Strasburg.
Wendle, Samuel S., Christiana.

LAWRENCE COUNTY.

Jewell & Martin, New Wilmington.
McKinley & Frantz, New Castle.
Moorhead, Frank B., Volant.
Palace Drug Store, Ellwood City.
Shields, F. O., New Bedford.

LEBANON COUNTY.

Boger, Chas. E., Lebanon.
Kline, William C., Myerstown.
Light, D. K., Palmyra.
Seabold, W. S., Annville.

LEHIGH COUNTY.

Backenstoe, M. J., Emaus.
Barndt, Mrs. S. K., Alburtis.
Dundore, Harry W., Emaus.
Horn's Drug Store, Coplay.
Horn, Chas. W., Slatington.
Keiper, H. L., Allentown.
Lawall Bros., Catasauqua.
Mohr, John J., Fogelsville.

LUZERNE COUNTY.

Briggs, Dr. J. F., Shickshinny.
Colborn, W. T., Ashley.
Durbin's Keystone Phar., Plymouth.
Edwards, E. J., Drifton.
Evans, Wm. E., Maltby.
Farrer & Peck, Pittston.
Grover, M. E., Freeland.
James, Henry H., Parsons.
Mans, H. W., Hazleton.
Meyer, R. H., Nanticoke.
Renniman & Co., Avoca.
White, W. D. & Co., Wilkes-Barre.

LYCOMING COUNTY.

Harter, C. W., Muncy.
Miller, John L., Montgomery.
Mintzer, Dr. L. H. C., Ralston.
Staples, B. E., Jersey Shore.
Sutliff, Jacob, Hughesville.
Walton, L. L. & Co., Williamsport.

McKEAN COUNTY.

Hogarth, L. K., Smethport.
Kane Drug Co., Kane.
Mills, John C., Duke Center.
Nourse, W. J., Mt. Jewett.
Thompson & Wood, Bradford.
Williams, J. H., Port Allegany.

MERCER COUNTY.

Crawford, C. E. J., Jamestown.
Donaldson, L. W. & Co., Jackson Center.
Forker, W. J., Grove City.
Good, J. R., Mercer.
Griffin, John L. Fredonia.
Hines, J. P., Stoneboro.
Jackson, T. C., Hadley.
Lewis, A. E., West Middlesex.
Martin, E. K. & Son, Sheakleyville.
Steele, H. A. G., Sharon.
West, Harry D., Greenville.

MIFFLIN COUNTY.

Bishop, D. K., Milroy.
Fultz, Allen, Wagner.
McDonald, J. A., Reedsville.
Muthersbough, J. A., Lewistown.
Roche, William F., McVeytown.
Shaver, Henry B., Newton Hamilton.

MONROE COUNTY.

Chamberlin, Edgar W., Mt. Pocono.
Red Cross Pharmacy, East Stroudsburg.
Rhoads, Dr. Geo. H., Tobyhanna.
Seguine, J. A., Cresco.
Trexler, Dr. J. A., Brodheadsville.
Trach, Dr. D. C., Kresgeville.
Wertman, Dr. A. A., Tannersville.

MONTGOMERY COUNTY.

Beshore Drug Company, Pottstown.
Bunting, Frank, Souderton.
Craig, James D., Fort Washington.
Culbert, Jos. W., Collegeville.
Huzzard, Curtis, Norristown.
King, A. J., Ardmore.
King, L. Stanley, Bala.
Kuhns, E. J., Lansdale.
McLaughlin, Harry A., Jenkintown.
Medico Drug & Chemical Co., Royersford.
Mensch, James G., Pennsburg.
Moore, Christian, Est., Bryn Mawr.
Neville, William, Conshohocken.
Pennepacker & Bromer, Schwenkville.
Rothwell, Walter, Hatboro.
Tiefenbach, J. T., North Wales.

MONTOUR COUNTY.

Gosh, J. D., & Co., Danville.

NORTHAMPTON COUNTY.

Burkhart, H. A., Bethlehem.
Eisenhart, E. K., Bangor.
Heller, H. D., Hellertown.
Jacoby, Cyrus, South Bethlehem.
Miller, S. R., Bath.
Scheffler, J. S., Pen Argyl.
Weaver's Pharmacy, Easton.
Yale, Ellsworth W., Siegfried.
Yeakel, Nelson L., & Co., Nazareth.

NORTHUMBERLAND COUNTY.

Armstrong, William K., Sunbury.
Clarkson, T. R., & Co., Shamokin.
Dunn, John B., Watsontown.
Keiser, E. L., Milton.
Krebs, J. S., Herndon.
Mengel, J. S., Trevorton.
Samuel, Dr. E. W., Mt. Carmel.
Standard Drug Store, Mt. Carmel.
Wenck, S. M. G., & Son, Northumberland.

POTTER COUNTY.

Chapman, G. F., Genesee.
Cool, W. F., Roulette.
Gilbert, W. E., Harrison Valley.
Lane, H. K., Ulysses.
Lyon, G. W., Shingle House.
McGee & Miller, Costello.
Meine, Dr. Chas., Germania.
Richardson, L., Cross Fork.
Robertson, J. W., Galeton.
Sanford, W. F., Austin.
Thompson, M. S. & Co., Coudersport.

PIKE COUNTY.

Armstrong, C. O., Milford.
Shannon, W. R., Lackawaxen.

PERRY COUNTY.

Eby, B. M., Newport.
Johnson, A. R., New Bloomfield.
Lahr, J. B., Millerstown.
Lakin, Dr. H. A., New Germantown.
Lehman, S. W., Duncannon.
Shuler, S. M. & Sons, Liverpool.
Zimmerman, Thaddeus, Ickesburg.

SCHUYLKILL COUNTY.

Beck, Charles F., Cressona.
Bensinger, G. I., Schuylkill Haven.
Brown, Geo. L., Minersville.
Coble, Dr. J. W., Tamaqua.
Cowen, William S., Pottsville.
Depew, J. A., Delano.
Driebelbis, G. W., Tower City.
Holt, William P., Frackville.
Houck, Paul W., Shenandoah.
Krebs, H. J., Mahanoy City.
People's Pharmacy, Tremont.
Sutton, John, Pine Grove.
Monaghan, Dr. W. J., Girardville.
Williams, R. J., Ashland.

SNYDER COUNTY.

Charles, Jerry, Freeburg.
Spangler, W. H., Middleburg.
Ulsh, Clavin, McClure.
Wagner, J. O., Beaver Springs.
Wagenseller, George D., Selinsgrove.

SOMERSET COUNTY.

Brallier, J. J., Berlin.
Dobson, G. L., Stoyestown.
Gross, Wm. H., Boswell.
Home Drug Co., Windber.
Jacobs, Dr. T. J., Somerfield.
McCormick, Mrs. D. H., Rockwood.
Mountain's Pharmacy, Confluence.
Picking, J. S., Somerset.
Pollard, R. T., Garrett.
Sembower, A. J., Markleton.
Thomas, F. B., Meyersdale.

SULLIVAN COUNTY.

Hoffa, Chas. W., Dushore.
Lancaster, H. D., Forksville.
Lopez Drug Co., Lopez.
Voorhees, C. D., Sonestown.

SUSQUEHANNA COUNTY.

Davis & Allen, Forest City.
French, A. P., Susquehanna.
Morris, F. D., Montrose.
Sands, F. E. & Co., Hallstead.
Taylor, A. J., Hopbottom.

TIOGA COUNTY.

Babcock, W. C., Blossburg.
Bates, John P., Mansfield.
Blatchley & Campbell, Wellsboro.
Darling's Pharmacy, Lawrenceville.
Fessler, T. A., Elkland.
Gilbert, F. L., Knoxville.
Holcomb, Frank B., Westfield.
Wells, J. E., Tioga.

UNION COUNTY.

Baker, Dr. T. D., Lewisburg.
Galloway & Meek, Allenwood.
Glover, O. W. H., Laurelton.
Steans, J. C., Mifflinburg.

VENANGO COUNTY.

Curtis, L. C., Utica.
Gosser Drug Co., Emlenton.
Griffith, E. J., Oil City.
McClintock Co., The, Kennerdell.
Strahl, Henry, Petroleum Center.
Third Ward Pharmacy, Franklin.
Zeamer, H. C., Pleasantville.

WARREN COUNTY.

Clark, A. A., Russell.
Kemble & Son, C., Tidioute.
McDonald, J. G., Sugar Grove.
Pierce, Wm. S., Warren.
Pryor, G. T., Sheffield.
Simpson Bros., North Clarendon.

WASHINGTON COUNTY.

Coulter & Co., McDonald.
Donaldson, J. B., Canonsburg.
Hogsett Bros., Monongahela.
Horn, H. M., Washington.
McMurray, H. B., Burgettstown.
Piper Bros., Charleroi.
Piper & Dague, Donora.
Retzer, Charles, Hickory.

WAYNE COUNTY.

Jadwin, C. C., Honesdale.
Snyder, M. T., Hawley.
Stevens, W. A., Hamlinton.
Tiffany, J. E., Pleasant Mount.

WESTMORELAND COUNTY.

Broadway Drug Co., Scottdale.
Coldsmith, C. F., Mt. Pleasant.
Cook, J. G., New Alexandria.
Fink, George W., Irwin.
Fox, Chas. E., Vandergrift.
Freeman, J. W., Derry.
Fry, F. L., Manor.
Hunnell, B. S., New Kensington.
Kirk, W. P., Monessen.
Martin, A. E., Greensburg.
Obley, H. A., West Newton.
Smith, Horace L., Jeanette.
Tassell Pharmacy, Latrobe.
Wilson, J. M., New Florence.
Wilt, R. A., Ligonier.
Zimmerman, W. J., Delmont.

WYOMING COUNTY.

Besteder, Charles, Center Moreland.
Reynolds, Oscar J., Nicholson.
Sickler, H., Tunkhannock.
Tibbins, George H., Noxen.

YORK COUNTY.

Britcher, Milton W., Dillsburg.
Emlet & Jenkins, Hanover.
Cable, John W., Hellam.
Seitz, J. E., Glen Rock.
Grove, J. H., New Freedom.
Hoke, Martin, Spring Forge.
Lafean, A. H. & Bro., York.
Meyers, G. A., Dallastown.
Moody, C. W., Red Lion.
Mull, Harry, Stewartstown.
Murphy, J. C., York Haven.
Overmiller, N. Allen, East Prospect.
Stacks, A. Homer, York.
Stahle, R. S., Emigsville.
Smith, Samuel S., Windsor.
Stewart, T. D., Delta.
Tinsley, G. S., Wrightsville.
Wallace, N. G., Dover.

COMMISSION.

Form A. D. No. 33.

COMMONWEALTH OF PENNSYLVANIA.
DEPARTMENT OF HEALTH.
Diphtheria Antitoxin Division.

Know all Men by these Presents, that .....
residing at .....in the county of .....
State of Pennsylvania, ha..... this ..... day of .....190..
been duly appointed Distributor of Diphtheria Antitoxin, at.....
.....County, Pennsylvania, under the rules of the Department of Health.

(Seal) .....

Commissioner of Health.

METHOD OF DISTRIBUTION.

After appointment the Distributor is furnished with an initial supply of serum, consisting of five packages of Antitoxin of 1,000 units and five packages of 3,000 units, together with blank forms, stamped envelopes, etc., necessary for its distribution; copies of which forms appear hereafter.

The physician discovering a case of Diphtheria anywhere in his locality among the poor, has but to go to the nearest druggist who is a distributor, sign a receipt and secure all the Antitoxin he needs for the treatment of the case or cases he has on hand.

Form No. 17-B.

COMMONWEALTH OF PENNSYLVANIA.
DEPARTMENT OF HEALTH.

APPLICATION AND RECEIPT FOR DIPHTHERIA ANTITOXIN.

....., 190..

I hereby acknowledge the receipt of the following named amounts of Diphtheria Antitoxin:

.....packages containing 1,000 units. Laboratory Nos.,.....
packages containing 3,000 units. Laboratory Nos.,.....
from .....Distributor, Address, ...
in the name of the Department of Health. I hereby certify that the persons mentioned for whose treatment this Antitoxin is furnished are indigent and unable to otherwise procure the same. I agree to make no charge for it directly or indirectly, and if unused to return to the Distributor within ten days; also to mail to the Department of Health, immediately upon termination, a clinical report for each case, on the blanks furnished for this purpose.

We have in stock at this time:—

.....packages of 1,000 units. .....
.....packages of 3,000 units. (Physician's signature.)

.....
(Address.)

.....
(Distributor's Signature.)

.....
(Full Address.)

with blue stub for Distributor's record; being application and receipt to be signed by the physician upon making application to the Distributor for Antitoxin for use on indigent patients in his locality found stricken with the disease, which gives the exact number of packages of Antitoxin, both 1,000 units, (immunizing) and 3,000 units (curative) taken by him, and which is forwarded to the Department with Form No. 19, mentioned below. The blue stub is for the Distributor's record of Antitoxin issued.

Form No. 17-B.

Blue Stub.

COMMONWEALTH OF PENNSYLVANIA.
DEPARTMENT OF HEALTH.

APPLICATION AND RECEIPT FOR DIPHTHERIA ANTITOXIN.

....., 190...

I hereby acknowledge the receipt of the following named amounts of Diphtheria Antitoxin:

.....packages containing 1,000 units. Laboratory Nos., ...
.....packages containing 3,000 units. Laboratory Nos., ...
from .....Distributor, Adress, ...
in the name of the Department of Health. I hereby certify that the persons mentioned for whose treatment this Antitoxin is furnished are indigent and unable to otherwise procure the same. I agree to make no charge for it directly or indirectly, and if unused to return to the Distributor within ten days; also to mail to the Department of Health, immediately upon termination, a clinical report for each case, on the blanks furnished for this purpose.

We have in stock at this time:—
.....packages of 1,000 units.
.....packages of 3,000 units.

.....
(Physician's Signature.)

.....
(Address.)

.....
(Distributor's signature.)

.....
(Full Address.)

Form A. D. No. 19.

Diphtheria Antitoxin.

..... Units.

Manufacturer.

.....

Laboratory No.

Date within which the unopened vial or attached slip must be returned to Distributor, ...

.....

COMMONWEALTH OF PENN'A.
DEPARTMENT OF HEALTH.

Diphtheria Antoxin, ...Units..
Manufacturer, ...Laboratory No...
Patient, ...Address,.....
Date of use, ...
Physician's signature, ...
Address, ...
Distributor's signature, ...
Address, ...

This slip when returned to Distributor must be forwarded to the Department of Health, together with the application for the same.

SAMUEL G. DIXON, Commissioner.

This slip is found placed around the outside of the packages of Antitoxin and is to be filled out by the physician using same; giving name of patient and address, date of use, physician's name and address, distributor's signature and address, and to be forwarded to the Department with Form No. 17-B above mentioned.

These slips, Forms A. D. No. 19, are filled out for 1,000 units immunizing and 3,000 units curative treatment, respectively; each slip or Form A. D. No. 19 representing one package of either 1,000 or 3,000 units strength; having also printed thereon the Laboratory number of the package of Antitoxin produced by the manufacturer.

Form A. D. No. 18b.

COMMONWEALTH OF PENNSYLVANIA.
DEPARTMENT OF HEALTH.

CLINICAL REPORT OF DIPHTHERIA TREATED WITH ANTITOXIN.

Use a separate blank for each case and forward immediately upon termination of the same to the Department of Health, Harrisburg, Pa.

Patient's name, ...Address, ...County, ...Pa.
Age, ...Sex, ...Color, ...Date of first visit, ...
Was treatment immunizing or curative? .....
If the treatment was immunizing, answer only the following questions:
Date of treatment, ...No. of units used, ...
How long had patient been exposed to the disease?.....
Did Patient subsequently contract the disease (Yes or No.)? .....
If the treatment was curative, answer the following questions:
Date of onset of the disease, ...

SPECIFY EACH TREATMENT.

.....units used within.....hours of onset.
.....units used within.....hours after first treatment.
.....units used within.....hours after second treatment.
.....units used within.....hours after third treatment.
.....units used within.....hours after fourth treatment.
.....units used within.....hours after fifth treatment.
State whether disease was Post-nasal, Tonsillar, Pharyngeal, Laryngeal.
(Specify by crossing out names of regions unaffected.)
State complications if any, ...
State termination (Recovery or Death), ...
Number of persons in household.....Number affected....Number immunized....
What was the probable source of infection?.....
Remarks, ...
Distributor's Name ..... Signature .....M. D.
Address ....

The above is the Clinical Report which gives the complete history of the case from the beginning of treatment to either recovery or death and which is to be signed by the physician and forwarded to the Department.

The three forms above mentioned when properly filled out make a complete record of each case of the distribution and use of Diphtheria Antitoxin issued by the Department of Health to the indigent throughout the entire State of Pennsylvania.

SUMMARY OF OBSERVATIONS UPON THE USE OF DIPHTHERIA ANTITOXIN BY THE DEPARTMENT FOR THE YEAR 1907.

CURATIVE TREATMENT.

The statistics compiled as taken from the clinical reports received from physicians covering the curative treatment of diphtheria among the indigent for the year 1907, show a marked decrease in the death rate over the year 1906, proving, conclusively, that the physicians throughout the entire State have, during the year, taken heed to the urgent requests of the Commissioner of Health, given from time to time, to use Antitoxin as early as possible after onset of the disease and in larger doses.

It will be shown by a comparison of Table No. 1 for the year 1907, with the same table for 1906, that 5,271 persons were treated for diphtheria with only 376 deaths (an increase in number treated, of 1,742 over the year 1906); that the death rate has been decreased from 11.13 per cent. in 1906 to that of 7.13 per cent. for the year 1907, (a reduction of 4 per cent.) Likewise it will also be noticed in Table No. 1, for 1907, compared with 1906, in the treatment of cases of diphtheria within the first twenty-four hours of onset, that the death rate has been reduced from 8.78 per cent. in 1906 to 4.59 per cent. in 1907; a decrease of a fraction over 4 per cent.; truly a most gratifying result to the Department. In each succeeding day of treatment after onset, comparing this same table for 1907 with 1906, a reduction in the death rate will be observed until the fourth day is reached, when a very silght fraction of an increase of the percentage of 1907 is shown over 1906; the fifth day treatment also being lower than in 1906, while in the sixth day treatment a marked increase is shown in 1907 over 1906, the seventh and eighth day treatments for 1907 being much lower than 1906.

In Table No. 2, showing "Results of treatment of Diphtheria with Antitoxin with relation to Sex and Age," it will be seen that 2,493 males and 2,778 females were treated for diphtheria in 1907, as compared with 1,634 males and 1,895 females in the year 1906. It also reveals the fact that in both years the greatest number of cases of diphtheria occurred in children of both sexes between the ages of 5 and 9 years; the females predominating in 1906, with 642 females to 595 males, and the males predominating in 1907, with 1,002 males to 979 females.

In Table No. 3, showing result of treatment of diphtheria with Antitoxin according to period of initial treatment after onset and age, it will be found that, in addition to the increased number of cases treated in 1907 over 1906, the number of recoveries amounting to 1,278, treated within the first twenty-four hours, also occurred in children between the ages of five to nine years; that the percentage of deaths in cases treated in the first twenty-four hours of onset has been reduced from 8.78 per cent. in 1906, to 4.57 per cent. in 1907, which would seem to bear out the statement made in the first paragraph, that physicians were using Antitoxin much earlier than in 1906.

In Table No. 4 showing treatment of diphtheria with Antitoxin according to areas affected and period of initial treatment after onset of disease, it will be seen that the largest number of cases treated were of the type known as tonsillar diphtheria and number 1,696, with but 19 deaths; showing the lowest death rate of this table, or 1.12 per cent. The highest rate of deaths in this table for 1906 was a combination of three types of diphtheria, "pharyngeal, tonsillar and laryngeal," which produced a death rate of 32.05 per cent. The highest death rate shown by this table for 1907 is 18.25 per cent., where the laryngeal type of diphtheria caused this percentage in a total of 482 cases treated, with 88 deaths. A comparison of the percentages of deaths of 1906 with 1907, for all cases of the tonsillar type of diphtheria, shows 1.90 per cent. in 1906 as against 1.12 per cent. in 1907.

In Table No. 5 showing result of treatment of diphtheria with Antitoxin in the several counties by the months, for 1907, it will be seen that diphtheria was prevalent in all of the sixty-six counties in the State where Antitoxin was distributed to the poor, except Forest and Fulton counties; that Lackawanna county heads the list with the largest number of cases treated, or 649, with 33 deaths, and the remarkably low death rate of 5.08 per cent. Allegheny county comes second with 385 cases treated with 19 deaths, or a still lower death rate of 4.93 per cent. Luzerne county is third with 322 cases treated with 24 deaths, and a death rate of 7.45 per cent. The lowest death rate is found in Armstrong county; where forty-eight cases were treated with but one death, or a mortality of 2.08 per cent. Another interesting feature shown by this table is that the treatment of diphtheria in Butler county with 7 cases; Centre county with 16 cases; Chester county with 46 cases; Crawford county with 20 cases; Erie county with 27 cases; Juniata county with 4 cases; Lawrence county with 87 cases; Pike county with 4 cases; Potter county with 6 cases; Sullivan county with 16 cases and Union county with 7 cases, resulted in each county in 100 per cent. of recoveries.

Diagram showing percentage of deaths in cases treated according to duration of disease for 1906 as compared with 1907.

Table No. 6 showing result of treatment of diphtheria with Antitoxin according to number of units used and period of treatment after onset, reveals the fact that the initial curative dose, or 3,000 units of Antitoxin, was administered within the first twenty-four hours of onset, in 1802 cases, with but 42 deaths, or a death rate of 2.32 per cent., as against 1,615 cases, with 110 deaths, or a death rate of 6.81 per cent. in the year 1906. It also reveals the fact, comparing it with the same table for 1906, that much more Antitoxin has been used in each day's treatment; the greatest amount of Antitoxin used in the entire treatment of any one case having been 65,000 units, showing that physicians have attended to the advice of the Commissioner of Health to use larger doses of Antitoxin. A careful inspection of this table also shows that the number of units used for the entire treatment of any single one of these cases will range all the way from 1,000 units up to 65,000 units, with a gradual increase of about 500 units' difference, until the maximum number of units is reached.

By Table No. 7 showing the number of cases where subsequent treatments of Antitoxin were administered after the first twenty-four hours, it will be seen that the number of units used, in the subsequent treatment of these cases, ranges all the way from 300 units to 62,000 units; until the maximum number is reached, showing again that the physicians have used much larger doses in cases where subsequent treatments were necessary than in 1906.

The total number of cases treated has been arranged into one set of tables numbered from 1 to 8 (number 1 to 7, inclusive, covering curative treatment, and number 8, immunization treatment) which give in detail the number of cases treated from January 1, 1907 to December 31, 1907, and show results tabulated under the following headings:

1. Period of initial treatment after onset of disease.
2. Showing results of treatment according to sex and age.
3. Period of initial treatment after onset and age.
4. Areas affected and period of initial treatment after onset of disease.
5. Number of cases treated in the several counties of the State by months with result.
6. Result of treatment of Diphtheria with Antitoxin according to number of units used and period of treatment after onset of disease.
7. Statement showing cases where subsequent treatments of Antitoxin were used after first twenty-four hours.
8. Number immunized, with result.

TABLE I.

Antitoxin Treatment of Diphtheria for 1907.

Initial Dose 3,000 Units.

Relation of Initial Treatment to Time of Onset.

Results.	Period in which Initial Treatment was Made.								
	1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day and over.	Total.
Totals,	3,463	1,139	403	136	63	30	24	13	5,271
Recoveries,	3,304	1,039	348	104	52	18	20	10	4,895
Deaths,	159	100	55	32	11	12	4	3	376
Percentage of deaths,	4.59	8.77	13.64	23.52	17.46	40.00	16.66	23.07	7.13

TABLE II.

Antitoxin Treatment of Diphtheria, 1907.

Initial Dose, 3,000 Units.

Result of Treatment of Diphtheria with Antitoxin with Relation to Sex and Age.

Results.	Sex.	Age Periods. 0-1	1-2	2-3	3-4	4-5	5-9	10-14	15-19	20+	Total.
Totals, ...	M.,	43	122	175	196	231	1,002	393	126	205	2,493
	F.,	19	83	179	196	220	979	496	212	394	2,778
											5,271
Recoveries, ...	M.,	36	80	149	175	207	947	380	117	197	2,288
	F.,	16	66	160	179	195	916	479	207	389	2,607
											4,895
Deaths, ...	M.,	7	42	26	21	24	55	13	9	8	205
	F.,	3	17	19	17	25	63	17	5	5	171
											376

TABLE III.

Antitoxin Treatment of Diphtheria, 1907.

Initial Dose, 3,000 Units.

Result of Treatment of Diphtheria with Antitoxin According to Period of Initial Treatment After Onset and Age.

Period of Treatment.	Results.	Age Periods. 0-1	1-2	2-3	3-4	4-5	5-9	10-14	15-19	20+	Total	Percentage.
1st day, ...	Total,....	45	121	231	247	295	1,334	582	206	396	3,457	
	Rec.,.....	39	94	215	232	274	1,278	570	202	394	3,298	
	Deaths,..	6	27	16	15	21	56	12	4	2	159	4.57
2d day, ...	Total,....	13	54	67	91	106	407	199	74	129	1,140	
	Rec.,.....	10	36	59	81	90	378	189	73	123	1,039	
	Deaths,..	3	18	8	10	16	29	10	1	6	101	8.85
3d day, ...	Total,....	5	13	30	31	30	146	65	37	45	402	
	Rec.,.....	4	9	18	24	26	130	62	33	42	348	
	Deaths,..	1	4	12	7	4	16	3	4	3	54	13.43
4th day, ...	Total,....	0	12	15	12	9	38	24	13	13	136	
	Rec.,.....	0	5	12	10	4	30	21	10	12	104	
	Deaths,..	0	7	3	2	5	8	3	3	1	32	23.52
5th day, ...	Total,....	2	3	5	6	8	22	9	3	7	65	
	Rec.,.....	2	1	2	4	7	19	9	3	7	54	
	Deaths,..	0	2	3	2	1	3	0	0	0	11	16.92
6th day, ...	Total,....	2	3	5	2	1	14	0	1	6	34	
	Rec.,.....	2	2	3	0	1	9	0	0	5	22	
	Deaths,..	0	1	2	2	0	5	0	1	1	12	35.29
7th day, ...	Total,....	0	0	1	2	0	9	6	4	2	24	
	Rec.,.....	0	0	0	2	0	8	5	3	2	20	
	Deaths,..	0	0	1	0	0	1	1	1	0	4	16.66
8th day and over,..	Total,....	0	0	0	1	2	5	4	1	1	13	
	Rec.,.....	0	0	0	1	0	5	3	0	1	10	
	Deaths,..	0	0	0	0	2	0	1	0	0	3	23.07
Total rec., ...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,895	
Total deaths, ..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	376	7.13

TABLE IV.

Antitoxin Treatment of Diphtheria, 1907.

Initial Dose, 3,000 Units.

Result of Treatment of Diphtheria with Antitoxin According to Areas Affected and Period of Initial Treatment After Onset of Disease.

Area.	Results.	Period Within Which Initial Treatment was Made.									
		1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day and over.	Total.	Per cent.
Post-nasal,	Total,	48	16	6	1	2	0	1	1	75	
	Rec.,	42	14	4	1	2	0	1	1	65	
	Deaths,	6	2	2	0	0	0	0	0	10	13.33
Pharyngeal,	Total,	146	41	7	8	0	0	0	1	203	
	Rec.,	142	38	6	5	0	0	0	0	191	
	Deaths,	4	3	1	3	0	0	0	1	12	5.90
Tonsillar,	Total,	1,258	308	88	25	9	3	4	1	1,696	
	Rec.,	1,247	304	86	24	9	3	3	1	1,677	
	Deaths,	11	4	2	1	0	0	1	0	19	1.12
Laryngeal,	Total,	283	118	46	20	7	5	2	1	482	
	Rec.,	244	91	36	14	4	2	2	1	394	
	Deaths,	39	27	10	6	3	3	0	0	88	18.25
All combined,	Total,	580	183	75	20	13	5	3	3	882	
	Rec.,	551	161	63	13	13	4	2	3	810	
	Deaths,	29	22	12	7	0	1	1	0	72	8.16
Pn. and phar.,	Total,	11	16	2	0	2	2	0	0	33	
	Rec.,	9	14	2	0	2	0	0	0	27	
	Deaths,	2	2	0	0	0	2	0	0	6	18.18
Pn., phar., ton.,	Total,	186	78	42	25	8	5	4	2	350	
	Rec.,	174	65	30	17	5	2	2	2	297	
	Deaths,	12	13	12	8	3	3	2	0	53	15.14
Pn., ton., lar.,	Total,	20	4	3	0	2	0	0	0	29	
	Rec.,	19	4	3	0	2	0	0	0	28	
	Deaths,	1	0	0	0	0	0	0	0	1	3.44
Pn. and lar.,	Total,	20	12	0	0	0	0	0	0	32	
	Rec.,	19	11	0	0	0	0	0	0	30	
	Deaths,	1	1	0	0	0	0	0	0	2	6.25
Ton. and lar.,	Total,	54	29	12	3	4	2	2	1	107	
	Rec.,	47	26	9	2	1	2	2	1	90	
	Deaths,	7	3	3	1	3	0	0	0	17	15.88
Ph., ton., lar.,	Total,	56	40	18	3	3	1	4	2	127	
	Rec.,	50	35	14	0	2	0	4	0	105	
	Deaths,	6	5	4	3	1	1	0	2	22	17.32
Ph. and ton.,	Total,	510	200	67	18	8	5	3	1	812	
	Rec.,	489	193	63	17	8	4	3	1	778	
	Deaths,	21	7	4	1	0	1	0	0	34	4.18
Pn. and ton.,	Total,	179	60	29	8	4	1	0	0	281	
	Rec.,	167	53	25	8	3	0	0	0	256	
	Deaths,	12	7	4	0	1	1	0	0	25	8.89
Ph. and lar.,	Total,	47	22	5	5	0	0	1	0	80	
	Rec.,	41	19	4	3	0	0	1	0	68	
	Deaths,	6	3	1	2	0	0	0	0	12	15.
Pn., ph., lar.,	Total,	57	12	2	0	1	1	0	0	73	
	Rec.,	55	11	2	0	1	1	0	0	70	
	Deaths,	2	1	0	0	0	0	0	0	3	4.10
Total,	Rec.,	.....	.....	.....	.....	.....	.....	.....	.....	4,886	
	Deaths,	.....	.....	.....	.....	.....	.....	.....	.....	376	
No area stated,	Rec.,	.....	.....	.....	.....	.....	.....	.....	.....	9	
	Deaths,	.....	.....	.....	.....	.....	.....	.....	.....	0	
Grand total,	Rec.,	.....	.....	.....	.....	.....	.....	.....	.....	4,895	
	Deaths,	.....	.....	.....	.....	.....	.....	.....	.....	376	7.13

TABLE V.

Antitoxin Treatment of Diphtheria, 1907.

Initial Dose, 3,000 Units.

Result of Treatment of Diphtheria with Antitoxin in the several Counties by the Months.

County.	Results.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Percentage.
Adams,	Total,....	0	0	0	0	0	0	0	5	1	0	0	0	10	
	Rec.,.....	0	0	0	0	0	0	0	3	1	4	0	0	8	
	D.,.....	0	0	0	0	0	0	0	2	0	0	0	0	2	20.00
Allegheny,	Total,....	15	16	25	21	10	9	27	38	36	72	62	54	385	
	Rec.,.....	13	14	24	21	10	9	25	36	34	71	58	51	366	
	D.,.....	2	2	1	0	0	0	2	2	2	1	4	3	19	4.93
Armstrong,	Total,....	1	2	6	1	2	0	1	1	0	11	15	8	48	
	Rec.,.....	1	2	6	1	2	0	1	1	0	11	15	7	47	
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	1	1	2.08
Beaver,	Total,....	3	2	1	1	0	5	0	0	2	10	2	2	28	
	Rec.,.....	3	2	1	1	0	3	0	0	2	8	2	2	24	
	D.,.....	0	0	0	0	0	2	0	0	0	2	0	0	4	14.28
Bedford,	Total,....	5	1	0	1	0	0	0	0	1	4	4	21	37	
	Rec.,.....	5	1	0	1	0	0	0	0	1	4	1	19	32	
	D.,.....	0	0	0	0	0	0	0	0	0	0	3	2	5	13.51
Blair,	Total,....	12	3	20	13	0	8	4	11	6	26	24	23	160	
	Rec.,.....	12	3	20	13	10	8	3	10	5	25	21	23	153	
	D.,.....	0	0	0	0	0	0	1	1	1	1	3	0	7	4.37
Bradford,	Total,....	7	4	10	13	4	6	2	7	6	10	19	9	97	
	Rec.....	7	4	10	12	4	6	2	6	6	9	17	7	90	
	D.,.....	0	0	0	1	0	0	0	1	0	1	2	2	7	7.21
Berks,	Total,....	12	2	7	3	2	2	2	4	3	12	17	11	77	
	Rec.,.....	11	2	7	2	1	2	2	2	3	9	15	9	65	
	D.,.....	1	0	0	1	1	0	0	2	0	3	2	2	12	15.58
Bucks,	Total,....	3	6	1	4	1	1	4	2	3	3	2	6	36	
	Rec.,.....	3	6	1	4	1	1	4	2	2	3	2	6	35	
	D.,.....	0	0	0	0	0	0	0	0	1	0	0	0	1	2.77
Butler,	Total,....	1	0	1	0	0	1	0	0	1	0	2	1	7	
	Rec.,.....	1	0	1	0	0	1	0	0	1	0	2	1	7	100
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cambria,	Total,....	18	14	16	6	5	5	7	10	13	34	26	46	200	
	Rec.,.....	17	14	14	5	3	5	6	9	12	33	24	42	184	
	D.,.....	1	0	2	1	2	0	1	1	1	1	2	4	16	8.
Cameron,	Total,....	2	0	1	0	0	0	0	0	1	0	0	0	4	
	Rec.,.....	1	0	1	0	0	0	0	0	1	0	0	0	3	
	D.,.....	1	0	0	0	0	0	0	0	0	0	0	0	1	25.
Carbon,	Total,....	6	8	3	6	3	1	2	4	5	6	2	7	53	
	Rec.,.....	6	8	3	6	1	1	2	4	3	5	2	7	48	
	D.,.....	0	0	0	0	2	0	0	0	2	1	0	0	5	9.43
Centre,	Total,....	0	1	0	2	1	0	1	0	0	4	4	3	16	
	Rec.,.....	0	1	0	2	1	0	1	0	0	4	4	3	16	100
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
Chester,	Total,....	9	3	0	0	0	2	0	2	4	13	6	7	46	
	Rec.,.....	9	3	0	0	0	2	0	2	4	13	6	7	46	100
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
Clarion,	Total,....	1	2	2	0	1	0	0	1	0	2	1	2	12	
	Rec.,.....	1	2	2	0	1	0	0	1	0	1	1	1	10	
	D.,.....	0	0	0	0	0	0	0	0	0	1	0	1	2	16.66
Clearfield,	Total,....	3	6	5	5	6	8	17	20	18	24	30	29	171	
	Rec.,.....	3	6	5	5	6	8	15	20	15	22	27	26	158	
	D.,.....	0	0	0	0	0	0	2	0	3	2	3	3	13	7.60
Clinton,	Total,....	13	4	4	4	2	8	4	2	0	8	4	5	58	
	Rec.,.....	13	3	4	4	2	8	4	2	0	6	4	5	55	
	D.,.....	0	1	0	0	0	0	0	0	0	2	0	0	3	5.17
Columbia,	Total,....	13	4	2	1	2	0	1	3	22	29	48	32	157	
	Rec.,.....	13	4	2	1	2	0	1	3	20	29	47	30	152	
	D.,.....	0	0	0	0	0	0	0	0	2	0	1	2	5	3.18

TABLE V.—Continued.

County.	Results.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Percentage.
Crawford,	Total,....	3	2	9	0	2	0	1	0	2	7	0	3	20	
	Rec.,.....	3	2	0	0	2	0	1	0	2	7	0	3	20	100
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cumberland,	Total,....	4	1	0	0	4	0	5	1	4	4	6	2	31	
	Rec.,.....	4	1	0	0	4	0	5	1	4	3	6	2	30	
	D.,.....	0	0	0	0	0	0	0	0	0	1	0	0	1	3.22
Dauphin,	Total,....	6	5	3	2	3	2	1	3	0	3	10	14	55	
	Rec.,.....	5	5	3	2	3	2	1	1	3	3	7	14	49	
	D.,.....	1	0	0	0	0	0	0	2	0	0	3	0	6	10.90
Delaware,	Total,....	8	6	15	9	8	14	6	5	14	19	18	22	144	
	Rec.,.....	8	5	12	9	8	13	6	5	14	16	17	22	135	
	D.,.....	0	1	3	0	0	1	0	0	0	3	1	0	9	6.25
Elk,	Total,....	4	5	11	4	1	5	1	5	5	14	3	18	76	
	Rec.,.....	4	5	11	4	1	5	1	5	5	14	3	15	73	
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	3	3	3.94
Erie,	Total,....	1	1	1	0	9	2	1	1	2	5	3	1	27	
	Rec.,.....	1	1	1	0	9	2	1	1	2	5	3	1	27	100
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fayette,	Total,....	1	0	0	2	2	1	0	0	4	21	3	4	38	
	Rec.,.....	1	0	0	2	2	1	0	0	4	19	3	4	36	
	D.,.....	0	0	0	0	0	0	0	0	0	2	0	0	2	5.26
Forest,	Total,....	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rec.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
Franklin,	Total,....	4	0	3	2	0	0	1	3	7	18	14	11	63	
	Rec.,.....	4	0	3	2	0	0	1	3	6	17	13	10	59	
	D.,.....	0	0	0	0	0	0	0	0	1	1	1	1	4	6.34
Fulton,	Total,....	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rec.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
Greene,	Total,....	0	0	1	0	0	0	0	1	0	1	12	8	23	
	Rec.,.....	0	0	1	0	0	0	0	1	0	0	11	8	21	
	D.,.....	0	0	0	0	0	0	0	0	0	1	1	0	2	8.69
Huntingdon,	Total,....	1	1	0	1	1	4	7	0	4	10	4	2	35	
	Rec.,.....	1	1	0	1	1	4	6	0	4	8	3	2	31	
	D.,.....	0	0	0	0	0	0	1	0	0	2	1	0	4	11.42
Indiana,	Total,....	0	0	0	0	3	5	0	2	1	1	9	10	31	
	Rec.,.....	0	0	0	0	3	5	0	2	1	1	7	9	28	
	D.,.....	0	0	0	0	0	0	0	0	0	0	2	1	3	9.67
Jefferson,	Total,....	1	0	2	1	1	2	4	1	3	2	5	1	23	
	Rec.,.....	1	0	1	1	1	2	3	1	3	2	5	0	20	
	D.,.....	0	0	1	0	0	0	1	0	0	0	0	1	3	13.04
Juniata,	Total,....	0	2	0	1	0	0	0	0	0	1	0	0	4	
	Rec.,.....	0	2	0	1	0	0	0	0	0	1	0	0	4	100
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lackawanna,	Total,....	48	40	42	34	31	35	28	46	53	81	112	99	649	
	Rec.,.....	46	35	39	31	27	34	28	45	50	75	109	97	616	
	D.,.....	2	5	3	3	4	1	0	1	3	6	3	2	33	5.08
Lancaster,	Total,....	2	1	4	4	1	1	0	0	1	5	7	9	35	
	Rec.,.....	2	1	4	3	1	1	0	0	1	5	7	9	34	
	D.,.....	0	0	0	1	0	0	0	0	0	0	0	0	1	2.85
Lawrence,	Total,....	14	7	2	3	3	3	3	5	6	6	19	16	87	
	Rec.,.....	14	7	2	3	3	3	3	5	6	6	19	16	87	100
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lebanon,	Total,....	11	8	8	19	14	7	6	11	8	10	7	21	130	
	Rec.,.....	9	6	8	16	11	7	6	11	7	8	7	21	117	
	D.,.....	2	2	0	3	3	0	0	0	1	2	0	0	13	10.
Lehigh,	Total,....	25	13	29	21	12	25	9	22	21	41	52	38	308	
	Rec.,.....	21	12	25	19	11	25	9	21	21	39	47	36	286	
	D.,.....	4	1	4	2	1	0	0	1	0	2	5	2	22	7.14
Luzerne,	Total,....	14	8	12	19	25	9	15	31	34	26	70	58	322	
	Rec.,.....	14	8	12	17	23	7	14	28	32	22	66	54	298	
	D.,.....	0	0	0	2	2	2	1	3	2	4	4	4	24	7.45

TABLE V.—Continued.

County.	Results.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Percentage.
Lycoming,	Total,....	6	5	7	1	1	1	11	9	11	17	28	22	119	
	Rec.,.....	6	5	6	1	1	1	10	9	11	15	28	20	113	
	D.,.....	0	0	1	0	0	0	1	0	0	2	0	2	6	5.04
McKean,	Total,....	7	4	5	1	0	1	4	0	0	4	3	4	33	
	Rec.,.....	4	4	4	1	0	1	4	0	0	3	3	4	28	
	D.,.....	3	0	1	0	0	0	0	0	0	1	0	0	5	15.15
Mercer,	Total,....	11	11	12	1	1	1	2	1	9	6	7	12	74	
	Rec.,.....	10	10	12	1	1	1	2	0	8	6	7	11	69	
	D.,.....	1	1	0	0	0	0	0	1	1	0	0	1	5	6.75
Mifflin,	Total,....	1	1	4	1	1	1	1	1	3	2	15	5	36	
	Rec.,.....	1	1	4	0	1	1	1	1	3	2	14	4	33	
	D.,.....	0	0	0	1	0	0	0	0	0	0	1	1	3	8.33
Monroe,	Total,....	0	1	2	3	4	2	1	2	5	0	6	2	28	
	Rec.,.....	0	1	2	3	4	2	1	1	5	0	5	2	26	
	D.,.....	0	0	0	0	0	0	0	1	0	0	1	0	2	7.14
Montgomery,	Total,....	9	13	4	3	9	9	7	9	16	27	24	24	154	
	Rec.,.....	8	11	3	3	9	8	7	8	14	25	24	20	140	
	D.,.....	1	2	1	0	0	1	0	1	2	2	0	4	14	9.09
Montour,	Total,....	4	1	0	2	2	8	6	0	1	1	3	4	32	
	Rec.,.....	4	1	0	1	2	7	6	0	1	1	3	3	29	
	D.,.....	0	0	0	1	0	1	0	0	0	0	0	1	3	9.37
Northampton,	Total,....	9	12	11	8	12	9	8	9	17	17	14	30	156	
	Rec.,.....	6	12	11	8	11	7	8	8	17	17	11	28	144	
	D.,.....	3	0	0	0	1	2	0	1	0	0	3	2	12	7.69
Northumberland,	Total,....	11	5	1	5	3	1	8	3	2	8	11	7	65	
	Rec.,.....	11	5	1	5	3	1	8	2	2	5	11	7	61	
	D.,.....	0	0	0	0	0	0	0	1	0	3	0	0	4	6.15
Perry,	Total,....	0	1	2	0	0	1	3	0	1	0	0	0	8	
	Rec.,.....	0	1	2	0	0	0	2	0	1	0	0	0	6	
	D.,.....	0	0	0	0	0	1	1	0	0	0	0	0	2	25.
Pike,	Total,....	0	0	0	4	0	0	0	0	0	0	0	0	4	
	Rec.,.....	0	0	0	4	0	0	0	0	0	0	0	0	4	100
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
Potter,	Total,....	0	0	0	2	0	0	0	0	0	0	4	0	6	
	Rec.,.....	0	0	0	2	0	0	0	0	0	0	4	0	6	100
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
Schuylkill,	Total,....	39	17	14	25	31	15	15	15	29	33	30	46	309	
	Rec.,.....	34	15	13	21	28	13	11	13	25	30	29	41	273	
	D.,.....	5	2	1	4	3	2	4	2	4	3	1	5	36	11.65
Snyder,	Total,....	6	0	2	2	0	0	0	2	2	1	0	2	17	
	Rec.,.....	6	0	2	2	0	0	0	2	2	1	0	1	16	
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	1	1	5.88
Somerset,	Total,....	9	7	1	3	3	8	5	2	4	16	11	10	79	
	Rec.,.....	7	7	1	3	3	8	5	2	4	14	10	10	74	
	D.,.....	2	0	0	0	0	0	0	0	0	2	1	0	5	6.32
Sullivan,	Total,....	0	1	5	1	6	0	1	0	0	1	0	1	16	
	Rec.,.....	0	1	5	1	6	0	1	0	0	1	0	1	16	100
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
Susquehanna,	Total,....	0	4	0	0	0	0	0	1	0	3	1	4	13	
	Rec.,.....	0	3	0	0	0	0	0	1	0	3	1	4	12	
	D.,.....	0	1	0	0	0	0	0	0	0	0	0	0	1	7.69
Tioga,	Total,....	0	2	1	3	2	1	1	0	2	2	1	0	15	
	Rec.,.....	0	2	1	3	2	1	1	0	1	2	1	0	14	
	D.,.....	0	0	0	0	0	0	0	0	1	0	0	0	1	6.66
Union,	Total,....	0	4	0	0	1	0	0	0	0	2	0	0	7	
	Rec.,.....	0	4	0	0	1	0	0	0	0	2	0	0	7	100
	D.,.....	0	0	0	0	0	0	0	0	0	0	0	0	0	
Venango,	Total,....	3	0	0	0	1	0	0	1	1	10	2	5	23	
	Rec.,.....	3	0	0	0	1	0	0	1	1	9	2	5	22	
	D.,.....	0	0	0	0	0	0	0	0	0	1	0	0	1	4.34
Warren,	Total,....	0	1	0	0	0	2	1	0	0	3	0	2	9	
	Rec.,.....	0	1	0	0	0	2	0	0	0	3	0	2	8	
	D.,.....	0	0	0	0	0	0	1	0	0	0	0	0	1	11.11

TABLE V.—Continued.

County.	Results.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Percentage.
Washington,	Total,	4	2	1	2	2	0	2	7	4	9	8	4	45	
	Rec.,	3	2	1	2	1	0	2	4	2	8	6	4	35	
	D.,	1	0	0	0	1	0	0	3	2	1	2	0	10	22.22
Wayne,	Total,	5	4	2	1	4	1	3	5	0	5	12	15	57	
	Rec.,	4	4	1	1	4	1	3	5	0	5	11	14	53	
	D.,	1	0	1	0	0	0	0	0	0	0	1	1	4	7.01
Westmoreland,	Total,	9	5	9	11	6	3	8	11	22	19	22	15	140	
	Rec.,	6	5	8	11	6	3	8	8	19	17	19	14	124	
	D.,	3	0	1	0	0	0	0	3	3	2	3	1	16	11.42
Wyoming,	Total,	2	0	1	0	1	1	2	0	5	0	0	1	13	
	Rec.,	2	0	1	0	1	1	2	0	4	0	0	1	12	
	D.,	0	0	0	0	0	0	0	0	1	0	0	0	1	7.69
York,	Total,	10	3	4	7	8	1	1	12	12	15	20	17	110	
	Rec.,	10	3	4	5	8	0	1	10	11	14	18	16	100	
	D.,	0	0	0	2	0	1	0	2	1	1	2	1	10	9.09
Total rec.,														4,895	
Total D.,														376	7.13

TABLE VI.

Antitoxin Treatment of Diphtheria, 1907.

Initial Dose, 3,000 Units.

Result of Treatment of Diphtheria with Antitoxin According to Number of Units Used and Period of Treatment After Onset of Disease.

Number of Units Used.	Results.	1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day and over.
1,000,	Total,	78	18	9	2	1	0	0	0
	Rec.,	77	17	7	1	1	0	0	0
	Deaths,	1	1	2	1	0	0	0	0
1,500,	Total,	4	0	2	0	0	0	0	0
	Rec.,	4	0	2	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
2,000,	Total,	60	15	4	0	1	0	0	1
	Rec.,	56	14	4	0	1	0	0	1
	Deaths,	4	1	0	0	0	0	0	0
2,500,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
2,700,	Total,	0	0	1	0	0	0	0	0
	Rec.,	0	0	1	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
3,000,	Total,	1,802	530	178	52	22	9	7	6
	Rec.,	1,760	509	163	41	18	8	6	6
	Deaths,	42	21	15	11	4	1	1	0
3,300,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
4,000,	Total,	167	44	11	2	3	1	0	0
	Rec.,	161	40	10	2	3	0	0	0
	Deaths,	6	4	1	0	0	1	0	0
4,500,	Total,	5	0	0	0	1	0	0	0
	Rec.,	5	0	0	0	1	0	0	0
	Deaths,	0	0	0	0	0	0	0	0

TABLE VI.—Continued.

Number of Units Used.	Results.	1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day and over.
5,000,	Total,	42	21	5	2	1	0	1	0
	Rec.,	38	18	3	2	1	0	1	0
	Deaths,	4	3	2	0	0	0	0	0
5,500,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
6,000,	Total,	706	279	85	38	10	3	11	5
	Rec.,	665	251	72	26	7	0	9	2
	Deaths,	41	28	13	12	3	3	2	3
6,500,	Total,	0	0	1	0	0	0	0	0
	Rec.,	0	0	1	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
7,000,	Total,	44	19	6	1	2	0	0	0
	Rec.,	39	17	5	1	2	0	0	0
	Deaths,	5	2	1	0	0	0	0	0
7,500,	Total,	3	0	0	0	0	0	0	0
	Rec.,	3	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
8,000,	Total,	18	8	6	3	2	2	0	0
	Rec.,	14	6	4	3	2	0	0	0
	Deaths,	4	2	2	0	0	2	0	0
9,000,	Total,	244	79	42	6	10	5	1	1
	Rec.,	227	69	36	5	7	1	1	1
	Deaths,	17	10	6	1	3	4	0	0
10,000,	Total,	23	9	3	3	4	1	0	0
	Rec.,	21	6	1	3	4	1	0	0
	Deaths,	2	3	2	0	0	0	0	0
10,500,	Total,	1	0	1	0	0	0	0	0
	Rec.,	1	0	1	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
11,000,	Total,	11	2	0	0	2	1	0	0
	Rec.,	10	2	0	0	2	1	0	0
	Deaths,	1	0	0	0	0	0	0	0
12,000,	Total,	103	41	20	13	2	6	2	0
	Rec.,	90	33	16	10	1	5	1	0
	Deaths,	13	8	4	3	1	1	1	0
13,000,	Total,	12	0	0	0	0	1	0	0
	Rec.,	12	0	0	0	0	1	0	0
	Deaths,	0	0	0	0	0	0	0	0
14,000,	Total,	5	3	1	1	0	0	0	0
	Rec.,	5	3	0	1	0	0	0	0
	Deaths,	0	0	1	0	0	0	0	0
15,000,	Total,	34	23	6	2	0	0	0	0
	Rec.,	30	21	4	1	0	0	0	0
	Deaths,	4	2	2	1	0	0	0	0
16,000,	Total,	4	6	2	1	0	0	0	0
	Rec.,	3	3	1	1	0	0	0	0
	Deaths,	1	3	1	0	0	0	0	0
17,000,	Total,	4	2	2	0	0	0	0	0
	Rec.,	3	1	2	0	0	0	0	0
	Deaths,	1	1	0	0	0	0	0	0
18,000,	Total,	34	18	3	2	0	0	0	0
	Rec.,	30	16	3	1	0	0	0	0
	Deaths,	4	2	0	1	0	0	0	0
19,000,	Total,	7	1	0	0	0	0	0	0
	Rec.,	6	0	0	0	0	0	0	0
	Deaths,	1	1	0	0	0	0	0	0
20,000,	Total,	3	2	2	0	0	0	0	0
	Rec.,	3	2	2	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0

TABLE VI.—Continued.

Number of Units Used.	Results.	1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day and over.
21,000,	Total,	11	5	2	2	0	0	0	0
	Rec.,	7	3	1	2	0	0	0	0
	Deaths,	4	2	1	0	0	0	0	0
22,000,	Total,	2	0	2	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	1	0	2	0	0	0	0	0
23,000,	Total,	1	1	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	1	0	0	0	0	0	0
24,000,	Total,	8	7	1	0	0	1	0	0
	Rec.,	7	3	1	0	0	1	0	0
	Deaths,	1	4	0	0	0	0	0	0
26,000,	Total,	0	0	1	0	0	0	0	0
	Rec.,	0	0	1	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
27,000,	Total,	7	4	2	0	0	0	0	0
	Rec.,	7	4	2	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
28,000,	Total,	0	0	0	0	0	0	1	0
	Rec.,	0	0	0	0	0	0	1	0
	Deaths,	0	0	0	0	0	0	0	0
30,000,	Total,	6	1	0	0	0	0	1	0
	Rec.,	5	0	0	0	0	0	1	0
	Deaths,	1	1	0	0	0	0	0	0
31,000,	Total,	2	1	0	0	0	0	0	0
	Rec.,	2	1	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
33,000,	Total,	3	1	1	1	0	0	0	0
	Rec.,	2	1	1	1	0	0	0	0
	Deaths,	1	0	0	0	0	0	0	0
35,000,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
36,000,	Total,	1	0	0	1	1	0	0	0
	Rec.,	1	0	0	1	1	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
39,000,	Total,	0	2	0	0	0	0	0	0
	Rec.,	0	2	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
40,000,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
42,000,	Total,	0	0	2	0	1	0	0	0
	Rec.,	0	0	1	0	1	0	0	0
	Deaths,	0	0	1	0	0	0	0	0
43,000,	Total,	0	0	0	0	1	0	0	0
	Rec.,	0	0	0	0	1	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
48,000,	Total,	0	0	1	0	0	0	0	0
	Rec.,	0	0	1	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
49,000,	Total,	0	0	1	0	0	0	0	0
	Rec.,	0	0	1	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
50,000,	Total,	0	0	0	1	0	0	0	0
	Rec.,	0	0	0	1	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
60,000,	Total,	1	0	0	0	0	0	0	0
	Rec.,	0	0	0	0	0	0	0	0
	Deaths,	1	0	0	0	0	0	0	0
65,000,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0

TABLE VII.

Antitoxin Treatment of Diphtheria for 1907.

Initial Dose, 3,000 Units.

Statement Showing Cases Where Subsequent Treatments With Antitoxin Were Used After First Twenty-four Hours.

Results.	Number of Cases.	Units Used.	Results.	Number of Cases.	Units Used.
Total,	1		Total,	4	
Rec.,	1	300	Rec.,	3	16,000
Deaths,	0		Deaths,	1	
Total,	2		Total,	4	
Rec.,	2	500	Rec.,	4	17,000
Deaths,	0		Deaths,	0	
Total,	86		Total,	19	
Rec.,	81	1,000	Rec.,	14	18,000
Deaths,	5		Deaths,	5	
Total,	1		Total,	2	
Rec.,	1	1,500	Rec.,	1	19,000
Deaths,	0		Deaths,	1	
Total,	46		Total,	10	
Rec.,	41	2,000	Rec.,	9	21,000
Deaths,	5		Deaths,	1	
Total,	913		Total,	1	
Rec.,	832	3,000	Rec.,	1	22,000
Deaths,	81		Deaths,	0	
Total,	62		Total,	5	
Rec.,	54	4,000	Rec.,	5	24,000
Deaths,	8		Deaths,	0	
Total,	2		Total,	1	
Rec.,	2	4,500	Rec.,	1	25,000
Deaths,	0		Deaths,	0	
Total,	21		Total,	7	
Rec.,	17	5,000	Rec.,	4	27,000
Deaths,	4		Deaths,	3	
Total,	372		Total,	1	
Rec.,	324	6,000	Rec.,	1	29,000
Deaths,	48		Deaths,	0	
Total,	24		Total,	4	
Rec.,	22	7,000	Rec.,	4	30,000
Deaths,	2		Deaths,	0	
Total,	2		Total,	5	
Rec.,	2	7,500	Rec.,	4	33,000
Deaths,	0		Deaths,	1	
Total,	13		Total,	1	
Rec.,	11	8,000	Rec.,	1	34,000
Deaths,	2		Deaths,	0	
Total,	103		Total,	1	
Rec.,	76	9,000	Rec.,	1	36,000
Deaths,	27		Deaths,	0	
Total,	10		Total,	1	
Rec.,	8	10,000	Rec.,	1	40,000
Deaths,	2		Deaths,	0	
Total,	1		Total,	1	
Rec.,	0	11,000	Rec.,	1	41,000
Deaths,	1		Deaths,	0	
Total,	67		Total,	1	
Rec.,	62	12,000	Rec.,	1	42,000
Deaths,	5		Deaths,	0	
Total,	5		Total,	1	
Rec.,	2	13,000	Rec.,	1	45,000
Deaths,	3		Deaths,	0	
Total,	4		Total,	1	
Rec.,	2	14,000	Rec.,	0	57,000
Deaths,	2		Deaths,	1	
Total,	39		Total,	1	
Rec.,	34	15,000	Rec.,	1	62,000
Deaths,	5		Deaths,	0	

In the diagram showing the percentage of deaths of cases treated according to duration of disease for 1906 as compared with 1907, it will be seen that the best results in the treatment of diphtheria with Antitoxin were obtained in the first twenty-four hours after onset of the disease and that the percentage of deaths increases in each twenty-four hours thereafter.

The results obtained as shown in this diagram would seem to indicate that physicians, generally, throughout the State were treating diphtheria among the poor at an earlier period after onset in 1907 than in 1906.

In this diagram it will also be noticed that in the fourth day treatments the percentage of deaths in 1907 was slightly increased over the year 1906.

A careful inspection of the clinical reports covering the 32 cases which resulted fatally (and in which treatment was not begun until four days after the onset of the disease) reveals the fact that 19 or nearly 60 per cent. of said cases showed laryngeal type of diphtheria together with one and in some cases two other types well defined, and that in 12 of the 19 cases above mentioned, only one package of three thousand units of Antitoxin was used in each case as the initial dose.

It is a well established fact that after the disease has been allowed to run for a period of three or four days before treatment with Antitoxin is begun, it is almost unreasonable to expect successful results.

It seems remarkable, indeed, that physicians did secure such successful results in many cases where they did not treat the patients until after the third, fourth, fifth, and even the sixth day after onset of the disease.

IMMUNIZATION TREATMENT FOR THE YEAR 1907.

In addition to the curative treatment for which Antitoxin is furnished free by the State to the indigent, the Department of Health also furnishes free, for use in preventing the spread of diphtheria, what is known as an immunizing dose of Antitoxin, 1,000 units strength, with which physicians are instructed to immunize all those in the household where the case of diphtheria is found, as well as all those outside of the house who may have come in contact with the patient.

Clinical reports received, in which Antitoxin had been used for the purpose of the immunization of persons who had been exposed to diphtheria, from January 1st to December 31st, 1907, show that

three thousand seven hundred and ninety-nine (3,799) persons had been immunized, of which number but thirty-four (34) were reported as having contracted diphtheria at some time within twenty-one days after immunization. Of these thirty-four cases but two cases resulted fatally.

Comparing the number immunized in 1907 with those immunized in 1906, it shows an increase of 1,465 in 1907 over the year 1906, and by comparing the Immunization Tables of 1906 with 1907 it will be seen that in 1906, seventy-seven persons out of a total of 2,334 immunized in that year contracted the disease, while in the year 1907, when 3,799 persons were immunized an increase as above stated of 1,465—only thirty-four persons contracted the disease.

For results in detail of the treatment for immunization during the year 1907, the following table is presented.

TABLE VIII.

Showing the Results of Treatment for Immunization, 1907.

Number Treated for Immunization.	Units used.	Number not developing diphtheria.	Number developing diphtheria.	Recoveries.	Deaths.
6,	250	6	0	0	0
1,	300	1	0	0	0
20,	333⅓	20	0	0	0
1,	400	1	0	0	0
133,	500	133	0	0	0
2,	700	2	0	0	0
9,	750	9	0	0	0
3,338,	1,000	3,304	34	32	2
57,	1,500	57	0	0	0
40,	2,000	40	0	0	0
1,	2,500	1	0	0	0
183,	3,000	183	0	0	0
1,	4,000	1	0	0	0
7,	6,000	7	0	0	0
3,799 Total,	.....	3,765	34	32	2

The following statement giving the number of syringes of Diphtheria Antitoxin supplied to Distributors during the three months of 1905 and during each month for the years 1906 and 1907, shows a steadily increasing demand for the use of this life saving agent in the treatment of Diphtheria and also reveals the fact that from October, 1905, to December 31, 1907, there was supplied to five hundred and twenty-nine distributors of Antitoxin, located in every

county of the State, 12,769 packages of one thousand units, or immunizing doses of Antitoxin, and 19,460 packages of three thousand units, or curative doses of Antitoxin:

NUMBER OF SYRINGES OF ANTITOXIN SUPPLIED TO DISTRIBUTORS BY MONTHS FROM OCTOBER, 1905, TO DECEMBER 31, 1907.

1905.				1906.		1907.	
	1,000 units.	3,000 units.		1,000 units.	3,000 units.	1,000 units.	3,000 units.
October,	64	59	January,	314	503	400	809
November,	2,517	2,488	February,	256	394	269	547
December,	377	462	March,	289	455	327	648
Total,	2,958	3,009	April,	235	476	316	641
			May,	148	295	282	468
			June,	118	243	221	433
			July,	156	314	363	535
			August,	143	336	526	824
			September,	564	768	347	703
			October,	1,016	1,408	648	784
			November,	824	1,271	670	1,297
			December,	525	1,007	804	1,293
			Total,	4,638	7,470	5,173	8,981

GRAND TOTAL.

	1,000 units.	3,000 units.
1905,	2,958	3,009
1906,	4,638	7,470
1907,	5,173	8,981
	12,769	19,460

SUMMARY.

1905.

Number of cases treated during October, November and December, 1905,	293
Number of deaths,	38
Percentage of deaths,	12.98
Number immunized,	155
Number immunized and later contracting the disease,	5
Number of syringes, 1,000 units, dispensed by distributors,	327
Number of syringes, 3,000 units, dispensed by distributors,	619
Total cost (including "Initial Supply," which cost $6,199.73),	$7,251.80

1906.

Number of cases treated from January 1st to December 31st, 1906,	3,529
Number of deaths,	393
Percentage of deaths,	11.13
Number immunized,	2,334
Number immunized and later contracting the disease (three deaths),	77
Number of syringes, 1,000 units, dispensed by distributors,	3,725
Number of syringes, 3,000 units, dispensed by distributors	6,564
Total cost,	$16,192.32

1907.

Number of cases treated from January 1st to December 31st, 1907,	5,271
Number of deaths,	376
Percentage of deaths,	7.13
Number immunized,	3,799
Number immunized and later contracting the disease (two deaths),	34
Number of syringes, 1,000 units, dispensed by distributors,	3,431
Number of syringes, 3,000 units, dispensed by distributors,	6,931
Total cost,	$17,387.13

GENERAL SUMMARY.

1905-1906-1907.

Number of cases treated from October, 1905, to December 31st, 1907,..	9,093
Number of deaths, ...	807
Percentage of deaths, ...	8.87
Number immunized, ...	6,288
Number immunized and later contracting the disease (five deaths),...	116
Number of syringes, 1,000 units, dispensed by distributors, ...	7,483
Number of syringes, 3,000 units, dispensed by distributors, ...	14,114
Total cost, ...	$40,831.25

THE DISTRIBUTION OF VACCINE AND VACCINE SUPPLIES.

The free distribution of Vaccine and Vaccine supplies is made by the Department of Health only to second-class townships and only to those people therein who are too poor to purchase the same, where no Boards of Health exist, also to boroughs just organized and to charitable institutions in Pennsylvania not receiving appropriations from the State, at the request of physicians located in any county in the State, (except Philadelphia county) upon the recommendation of the County Medical Inspector.

Under the urgency of a serious epidemic, however, the stringency of this rule may be relaxed, the safety of the people being of vastly more importance than economy in administration.

During the year 1906, Glycerinized Vaccine Points and Vaccine Lymph for use in the vaccination of persons exposed to smallpox, were supplied through the duly organized channels to seventeen different localities throughout the entire State, namely: Ansonville, Kylertown, Du Bois, New Millport, Clearfield county; Chadds Ford, Chester, Delaware county; Webster Mills, Warfordsburg, Fulton county; Ernest, Indiana, Indiana county; Port Kennedy, Montour county; Honesdale, Wayne county; Warren, Warren county; Force, Elk county; Linglestown, Dauphin county; Brookville, Jefferson county; Elmora, Cambria county, which shows how little, comparatively speaking, the inhabitants of the State had been exposed to this disease, since only 1,610 Glycerinized Vaccine Points and only 110 tubes of Vaccine Lymph were furnished physicians throughout the entire year, the entire cost of these supplies having been only $68.47.

During the year 1907, the free distribution of Vaccine matter was confined to ten different localities in the State, namely: Wells, Bradford county; Tioga, Tioga county; Chester, Delaware county; Equinunk, Wayne county; McConnellsburg, Fulton county; Ansonville,

Elmora, Clearfield county; Castle Shannon, Allegheny county; Ludlow, McKean county; Bloomsburg, Columbia county. Only 1,070 Glycerinized Vaccine Points and 390 tubes of Vaccine Lymph were furnished physicians during the entire year, the entire cost of furnishing these supplies being only $42.83, a decrease of $25.46, in the cost of said supplies for 1907 as compared with 1906.

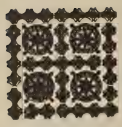
The following statement shows the number of cases of smallpox occurring in the years 1906 and 1907, by the months:

1906.		1907.	
January,	10	January,	7
February,	9	February,	4
March,	4	March,	9
April,	12	April,	7
May,	19	May,	3
June,	7	June,	6
July,	7	July,	14
August,	3	August,	4
September,	0	September,	1
October,	0	October,	2
November,	2	November,	1
December,	0	December,	4
Total,	73	Total,	62

THE DIVISION OF ACCOUNTING AND PURCHASING.

ACCOUNTING AND PURCHASING AGENT, E. I. SIMPSON.

25—16—1907



THE DIVISION OF ACCOUNTS.

FINANCIAL REPORT.

The Commissioner begs leave to respectfully report that under the three Appropriations of the Legislature of 1905, for the use of the several divisions of the Department, the following sums were received and expenditures made during the year of 1905-6, as per First Annual Report of the Department:

APPROPRIATIONS.

Act No. 506 for general salaries and expenditures of the Department for two years ending May 31st, 1907,.....	$300,000 00	
Expended as per Report, year ending December 31st, 1906, ...	117,695 43	
Unexpended balance of Appropriation, January 1st, 1907, ...		$182,304 57
Act No. 221 for salaries and expenditures of the Bureau of Vital Statistics for two years ending May 31st, 1907, ...	18,000 00	
Expended as per Report year ending December 31st, 1906, ...	13,745 51	
Unexpended balance of Appropriation January 1st, 1907, ...		$4,254 49
Act No. 219 for emergencies for two years ending May 31st 1907, ...	50,000 00	
Expended as per Report year ending December 31st, 1906, ...	20,191 09	
Unexpended balance of Appropriation January 1st, 1907,.....		29,808 91

and that the Receipts and Expenditures from January 1st, 1907 to May 31st, 1907, on account of the three foregoing Appropriations have been as follows:

GENERAL FUND ACT NO. 506.

Cash on hand as per Report year ending December 31st, 1906, ...	$69,804 57
Received from the Auditor General, warrant on account as follows: March 8, 1907, ...	37,500 00
Making total receipts, May 31st, 1907, ...	$107,304 57

That the expenditures from December 31st, 1906, to May 31st, 1907, have been as follows:

Advertising rules and regulations,	$7 70	
Advisory Board, traveling expenses, attending meetings,	32 82	
Commissioner's traveling expenses,	169 25	
Distribution of diphtheria antitoxin,	15,614 15	
Salaries, antitoxin division,	1,122 25	
Inspecting, disinfecting, quarantining, etc., account diphtheria,	2,355 18	
Inspecting, disinfecting, quarantining, etc., account scarlet fever,	2,705 96	
Inspecting, disinfecting, quarantining, etc., account smallpox,	1,104 92	
Vaccinations,	360 67	
Inspecting, disinfecting, quarantining, etc., account typhoid fever,	1,698 60	
Inspecting, disinfecting, quarantining, etc., account cerebro-spinal meningitis,	5 00	
Inspecting, disinfecting, quarantining, etc., account tuberculosis,	100 00	
Inspecting, disinfecting, quarantining, etc., account measles and mumps,	25 10	
Inspecting, disinfecting, quarantining, etc., account rabies,	62 50	
Establishment and maintenance of laboratory,	4,999 28	
Collecting, tabulating and filing morbidity statistics,	3,926 97	
Mosquito investigations,	17 91	
Inspecting and abating nuisances,	9,450 45	
General office expenses,	4,712 79	
Disinfectants,	7,481 61	
General salaries,	14,428 29	
Sanitary Engineering Division, salaries, travelling expenses, etc.,	9,638 74	
Legal services,	2,433 79	
Collecting and recording marriage statistics,	614 28	
Total expenditures,	$83,068 21	
Cash balance on hand May 31st, 1907,	24,236 36	
		$107,304 57

Note: That the following amounts were paid to the Department:

April 16, 1907, being for certified copies of births and deaths,	$100 00	
May 18, 1907, being refund of expenses incurred in abating nuisances,	263 43	
June 25, 1907, being interest on deposit balance,	628 92	
Aug. 28, 1907, being refund of deposit on mileage books,	70 00	
		$1,062 35

That the same were returned to the State Treasurer as follows:

April 16, 1907,	$100 00	
May 18, 1907,	263 43	
June 25, 1907,	628 92	
Aug. 28, 1907,	70 00	
		$1,062 35

That the cash balance on hand May 31st, 1907, was returned to the State Treasurer: August 28, 1907, ... $24,236 36

SUMMARY.

Appropriation,		$300,000 00
Expenditures to Dec. 31, 1906,	$117,695 43	
Expenditures from December 31st, 1906, to May 31st, 1907,	83,068 21	200,763 64
Unexpended balance of appropriation reverting to State Treasury,		$99,236 36

BUREAU OF VITAL STATISTICS FUND, ACT NO. 221.

Cash on hand as per Report year ending December 31st, 1906, ...	$2,004 49
Received from the Auditor General, warrant on account as follows, March 18, 1907, ...	2,250 00
Making total receipts, May 31, 1907, ...	$4,254 49

That the expenditures from December 31, 1906, to May 31, 1907, have been as follows:

General office expenses,	$170 87	
Postage, expressage, etc.,	809 00	
Salaries,	3,101 65	
Travelling expenses,	39 16	
Legal expenses,	20 00	
Total expenditures,	$4,140 68	
Cash balance on hand May 31st, 1907,	113 81	$4,254 49

Note:—That the following amounts were paid to the Department:

May 29, 1907, being interest on deposit balance,	$16 10	
June 25, 1907, being interest on deposit balance,	4 80	$20 90

That the same were returned to the State Treasurer as follows:

May 29, 1907,	$16 10	
June 25, 1907,	4 80	$20 90

That the cash balance on hand May 31, 1907, was returned to the State Treasurer, June 25, 1907, ... $113 81

SUMMARY.

Appropriation,		$18,000 00
Expenditures to December 31, 1906,	$13,745 51	
Expenditures from December 31st, 1906, to May 31st, 1907,	4,140 86	17,886 19
Unexpended balance of appropriation reverting to State Treasury,		$113 81

EMERGENCY FUND, ACT 219.

Cash on hand as per Report, year ending December 31, 1906,.....		$6,679 12
Received from the Auditor General, warrant on account, ...		(none.)
Making total receipts, May 31, 1907, ...		$6,679 12
That the expenditures from December 31, 1906, to May 31, 1907, have been as follows:		
Disinfecting and quarantining account of typhoid fever,	$2,841 47	
Disinfecting and quarantining account of smallpox,.....	2,708 51	
Total expenditures, ...	$5,549 98	
Cash balance on hand May 31, 1907, ...	1,129 14	$6,679 12
Note: That the following amounts were paid to the Department:		
June 25, 1907, being interest on deposit balance, ...	$51 74	
October 21, 1907, being interest on deposit balance, ...	14 08	
		$65 82
That the same were returned to the State Treasurer as follows:		
June 25, 1907, ...	$51 74	
October 21, 1907, ...	14 08	
		$65 82
That the cash balance on hand May 31st, 1907, was returned to the State Treasurer, Sept. 3, 1907, ...		$1,129 14

SUMMARY.

Appropriation, ...		$50,000 00
Expenditures to December 31, 1906, ...	$20,191 09	
Expenditures from December 31, 1906, to May 31st, 1907,	5,549 98	25,741 07
Unexpended balance of appropriation reverting to State Treasury,.		$24,258 93

The Commissioner further begs leave to respectfully report that the Legislature of 1907 made three appropriations for the use of the several Divisions of the Department as follows:

Act No. 673 for general salaries and expenditures of the Department for two years ending May 31st, 1909, ...	$1,100,600 00
Act No. 673 for the establishing and maintenance of Tuberculosis Dispensaries for two years ending May 31st, 1909, ...	400,000 00
Act No. 157 for the establishing and maintenance of one or more Tuberculosis Sanatoria for two years ending May 31st, 1909,.....	600,000 00

and that the receipts and expenditures from June 1st, 1907 to December 31st, 1907, on account of the three foregoing appropriations have been as follows:

GENERAL FUND ACT NO. 673.

That there have been received from the Auditor General warrants on account as follows:		
June 25, 1907, ...	$44,138 00	
August 28, 1907, ...	44,138 00	
November 22, 1907, ...	44,138 00	
December 12, 1907, ...	44,138 00	
		$176,552 00

That the Auditor General has issued warrants on account, general salaries to December 31, 1907,		11,208 96
Making total receipts, Dec. 31, 1907,		$187,760 96

That the expenditures from June 1st, 1907, to December 31, 1907, have been as follows:

Inspecting, disinfecting, quarantining, etc., on account of following:		
Cerebro-spinal meningitis,	$57 21	
Chicken pox,	121 90	
Diphtheria,	9,962 46	
Dysentery,	4 80	
Erysipelas,	5 01	
Hydrophobia,	25 25	
Measles,	1,452 69	
Membranous croup,	12 85	
Scarlet fever,	2,994 01	
Smallpox,	952 57	
Scabies,	17 67	
Spinal paralysis,	28 78	
Scarlatina,	12 50	
Tuberculosis,	37 76	
Typhoid fever,	3,960 51	
Vermin,	15 64	
Whooping cough,	314 78	
Guarding and keeping leper,	172 71	
Disinfectants,	1,139 98	
Vaccinations,	146 40	
Collecting, tabulating and filing marriage statistics,	1,236 32	
Collecting, tabulating and filing morbidity statistics,	5,728 32	
Collecting, tabulating and filing vital statistics,	1,965 03	
Inspecting and abating nuisances,	25,085 89	
Instructions to and supervision of health officers and organizing local Boards of Health,	2,230 42	
Sanitary engineering Division, salaries, traveling expenses, etc.,	28,712 18	
Sanitary inspection of schools,	7,298 43	
Advertising rules and regulations,	1,593 63	
Commissioners traveling expenses,	170 19	
General salaries,	29,045 66	
General office expenses,	4,400 52	
Establishment and maintenance of laboratory,	4,894 06	
Legal services,	961 25	
Advisory board, traveling expenses attending meetings,	6 24	
Attending scientific and educational meetings, etc.,	155 48	
Mosquito inspection,	2 62	
Total expenditures,		$134,921 72
Cash balance on hand, December 31, 1907,		52,839 24
		$187,760 96

Note: That the following amounts were paid to the Department:		
July 23, 1907, being refund of freight charges,	$19 80	
December 31, 1907, being interest on bank deposit,	378 89	
December 31, 1907, being for certified copies of births and deaths,	583 00	$981 69
That the same were returned to the State Treasurer as follows:		
July 26, 1907,	$19 80	
December 31, 1907,	378 89	
December 31, 1907,	583 00	$981 69

SUMMARY.

Appropriation,	$1,100,600 00
Expenditures to December 31, 1907,	134,921 72
Unexpended balance of appropriation,	$965,678 28

DISPENSARIES FUND ACT NO. 673.

That there have been received from the Auditor General warrants on account, as follows:	
July 26, 1907,	$16,666 67
Nov. 24, 1907,	16,666 67
Making total receipts Dec. 31, 1907,	$33,333 34

That the expenditures from June 1, 1907, to December 31, 1907, have been as follows:		
Furnishing and equipping dispensaries,	$1,493 05	
Rental of dispensaries,	831 34	
Maintenance of laboratory,	850 25	
Traveling expenses, nurses and doctors,	430 41	
General office expenses,	313 52	
Salaries, office, doctors and nurses,	1,373 14	
Distribution of sputum cups, napkins, etc.,	2,614 18	
Distribution of milk and eggs,	550 75	
Drugs and disinfectants,	102 20	
Examination for admission to Mont Alto,	216 98	
Disinfecting houses,	31 00	
Legal services,	4 00	
Total expenditures,	$8,810 82	
Cash balance on hand, Dec. 31, 1907,	24,522 52	
		$33,333 34
Note: That the following amount was paid to the Department:		
Nov. 30, 1907, being interest on bank deposits,	$61 01	$61 01
That the same was returned to the State Treasurer December 7, 1907,	$61 01	$61 01

SUMMARY.

Appropriation,	$400,000 00
Expenditures to December 31, 1907,	8,810 82
Unexpended balance of appropriation,	$391,189 18

SANATORIA FUND, ACT NO. 157.

That there have been received from the Auditor General warrants on account as follows:

June 17, 1907,	$25,000 00
Aug. 31, 1907,	50,000 00
Nov. 30, 1907,	25,000 00
Making total receipts Dec. 31, 1907,	$100,000 00

That the expenditures from June 1st, 1907, to December 31, 1907, have been as follows:

Buildings and real estate of Mountain Side Sanitorium, purchased from J. T. Rothrock,	$27,550 00	
Building materials for additions and improvements,	5,943 82	
Sewage disposal plant on account construction,	4,652 61	
Salaries, engineers, etc., on account construction,	5,519 38	
Traveling expenses, engineers, etc., on account construction,	154 47	
Furnishings for buildings,	13,254 45	
Nurses' salaries,	267 66	
Doctors' salaries,	625 02	
Miscellaneous salaries,	1,946 57	
Milk and eggs,	3,768 62	
Food stuffs, other than milk and eggs,	2,721 32	
Operating supplies,	1,088 57	
Drugs,	734 80	
Traveling expenses, doctors, nurses, etc.,	194 59	
Sundry operating expenses,	945 05	
Total expenditures,	$69,366 93	
Cash balance on hand Dec. 31, 1907,	30,633 07	$100,000 00

Note: That the following amount was paid the Department:

December 31, 1907, being interest on bank deposit,	$282 52

That the same was returned to the State Treasurer as follows:

Dec. 31, 1907,	$282 52

SUMMARY.

Appropriation,	$600,000 00
Expenditures to Dec. 31, 1907,	69,366 93
Unexpended balance of appropriation,	$530,633 07

STORE ROOM.

CHARLES HARTZELL, Storekeeper.

REPORT OF STORE KEEPER FOR NOVEMBER AND DECEMBER, 1907.

The work of the Department of Health increased so rapidly and the demands of the several Divisions for stationery and supplies were such that the absolute necessity for a Storekeeper or supervising official, who should devote his attention entirely to this work, soon became apparent.

Charles Hartzell, of Philadelphia, was therefore appointed and assumed the duties of Storekeeper on October 28th, 1907, in room 48 in the north end of the Capitol.

There having been no recognized head for this particular work, prior to Mr. Hartzell's appointment, there was a necessity for entire reorganization.

It was at once found that more room was needed and on application an additional room was promised in the coming year.

The duties of the Storekeeper are to receive, receipt for, arrange and care for all stationery, desk furniture, printed circulars, forms, reports and miscellaneous supplies; to furnish all such supplies to the seven hundred and fifty (750) Health Officers throughout the State; also to the sixty-seven (67) County Medical Inspectors, and the sixty-seven (67) or more Tuberculosis Dispensaries to be established and operated in each county of the State in the ensuing year, as well as to the different Divisions of the Department; to draw up requisitions for and keep accounts of all supplies needed from time to time, and to make up the schedules, outfits, files, lists, etc., necessary for the work of the Department in its several Divisions, and to keep account of the stock on hand.

One of the most important of his duties will be to have certain outfits and special supplies selected, counted and arranged systematically so that they may be mailed or shipped at a moment's notice, correct and prompt shipping of important supplies being absolutely necessary in order to obtain the results desired by the Department.

In addition to the routine work much time has been devoted during the past two (2) months to cleaning up, and re-arranging the stock on hand; but it will take much persistent labor with additional assistance to get this branch of the Department on the high plane of efficiency that is desired.

SPECIAL REPORTS.

PENNSYLVANIA STATE SOUTH MOUNTAIN SANATORIUM.

DR. ADDISON MAY ROTHROCK, Resident Physician.

The Sanatorium at Mt. Alto had its beginning in the summer of 1902, when a party camped for a few weeks back four miles from the station in the mountain. One of the campers was an asthmatic and a little eight by eight foot cabin was built of second hand lumber for his accommodation. From this cabin, which is still in use, sprang the present camp.

The first buildings erected after this were plain little square cabins ten feet each way, and for the first year this was all that could be offered—simply the shelter. Those who came cared for themselves in every particular.

In 1903 the Legislature appropriated eight thousand dollars for the erection and maintenance for two years of a camp at Mt. Alto. Six small cottages and an Assembly Building were then constructed and the original cabins were moved to a newer and drier site.

Through the generosity of the ladies of the Phoenixville and Kennett Square Club another cottage large enough for four more patients was constructed, bringing the capacity of the camp up to twenty-six.

It was still impossible to furnish the meals to the patients, but they were given shelter, fuel, medicine and medicinal attention free, and a matron and resident physician were appointed to care for them.

In 1905 the Legislature appropriated fifteen thousand dollars to maintain the camp for the next two years. A kitchen and dining room were then installed and everything was furnished but the laundry at the charge of one dollar a week.

In 1907 Governor Stuart in his inaugural pledged himself to this work and brought it earnestly to the attention of the Legislature early in the session and the sum of six hundred thousand dollars was appropriated to the Department of Health for the erection and maintenance of one or more Sanatoria for the care of tuberculosis. The Camp at Mont Alto was then transferred from the Department of

26—16—1907

Forestry to the Department of Health at the request of the Forestry Department and at once the work of planning and constructing a large institution was commenced.

The camp is located in the heart of the South Mountain range in Franklin county and includes within its limits between five and six hundred acres of land surrounded by a State forest reservation of fifty-five thousand acres.

The site is a little over sixteen hundred feet above sea level with the ground rising three or four hundred feet higher on all sides, thus forming a small basin of four or five miles in area. Passes open in through the mountain from the southwest and northeast and east. The land is well wooded and watered and the forests are stocked with game and the streams with trout.

In summer the weather is rarely oppressive and no matter how hot the day may be at the foot of the mountain one is always greeted with a cool refreshing breeze as the summit is reached on the climb up to camp. At night it is safe to say that it is always cool enough to sleep comfortably.

During the winter months, as might be expected, the temperature is somewhat lower than in the neighboring Cumberland Valley, but even so it seldom in the course of an entire winter falls to the zero mark.

There is a large number of excellent springs on every hand, and careful analysis shows the water to be very free from mineral substance, while the engineering work done for its protection makes it next to impossible for the water supply to become infected.

Two different lines of springs are piped into the two extreme ends of our Camp into two cement collecting basins capable of holding 7,500 and 42,000 gallons. From these basins the water is then pumped to a much larger cement reservoir of a capacity of 300,000 gallons, above the level of the Camp, and from here water mains conduct it down the streets and into the various buildings where it is in use.

Our sewage is all collected into a regular sewer system running down the main streets and is then conducted about a mile below the Camp. Here it passes through a septic tank from whence it is piped to a sprinkling plant where the fluid is sprinkled out over crushed stone. In this manner the air and sunlight do their work of destroying the anaerobic micro-organisms in the mass. Next the material goes into a sand filter and from here passes on to another tank where it is treated with chlorinated lime. It is then turned out to percolate away, and this last fluid as it leaves the plant is as safe as sewage can be made.

The grounds around this disposal plant have been most carefully cleaned up and from the generally attractive appearance a visitor would scarcely believe, unless he were so informed, that this was the outlet for the sewage from the Camp. In fact visitors have inquired whether it was not the water works.

As soon as the large appropriation became available twenty-five army hospital tents were erected on the grounds of the old Camp. These tents had each a large fly covering them and extending an equal distance beyond their front end. The body of each tent is double floored with a layer of paper between the two sets of boards and the fly is likewise floored at a level somewhat lower than that of the interior of the tent. This provides not only a good shelter to the inmates but likewise makes a convenient porch and gives a sheltered spot for a rank of fire wood and the buckets and cleaning apparatus of the inmates.

There is a wood stove for every tent and one is surprised to find how comfortable these little shelters have been made all winter long. Four persons occupy a tent and this provides comfortable room with no undue crowding.

We did not have a single case of pneumonia or any other untoward result during the entire period of cold weather during which they were in use.

Forty-one new cottages have just been completed each one of which will care for eight patients. These cottages are laid out on little blocks, each block having a double row of five houses with the corners of the houses directed to the four cardinal points of the compass—north, south, east and west.

All of the cottages are twenty-seven feet square with four bed rooms, each for two patients, and a hall running through the middle of the building, heated with a coal stove, affording a comfortable dressing room. The eaves are not allowed to project far over the edges, as a maximum amount of sunlight within is to be desired. It is for this same reason that the corners and not the sides are faced towards the cardinal compass points, for such an arrangement of the buildings permits the maximum amount of sunlight to enter the rooms fronting towards the north, a point much to be desired especially during the colder portion of the year.

All of the new buildings are roofed with asbestos shingles, giving us the most durable as well as the most fire proof material, a great advantage in a well wooded mountainous region.

Our dining room building lies in almost the middle of our present camp and exactly in the center of the new group of cottages. It is a large T shaped structure and there is comfortable room for five hundred patients in the long wing of the T while the rear portion will provide for kitchen, bakery, cold storage, servants' dining room

and the other dining building necessities. The second floor accommodates the help, and the splendid high third story gives us an ideal storage place.

Sixteen large open pavilions with their floors sloping from the center to the sides, give us ample room for our patients to take the cure.

These pavilions are forty feet by twenty-two, and will be provided with drop curtains of canvas to protect the inmates from rain or snow if need be.

Three bath houses, every one equipped with shower bath and toilet facilities, provide ample opportunity for bathing. Each one of the bath houses is steam heated and has at one end the sitting room; in the middle is the room where the bath compartments are situated, while the far end is devoted to a furnace and coal room.

A short distance below the camp, the laundry is located with not only a complete line of laundry machinery adequately housed but also with comfortable quarters for the employes of the plant.

About half a mile distant from the portion of the camp so far considered, a large two and a half story Infirmary is approaching completion. It is a T shaped building three hundred and twenty-five feet in length and lies protected by the crest of an abruptly rising hill from the northwest and north winds.

The Infirmary we expect to be able to occupy in January, 1909, by which time it has been contracted to be turned over to us.

A beautiful grove of white pine well trimmed and cleared from underbrush, lies just along the northern edge of the building and under its shelter is to be found an ideal resting place for the patients. Some years ago it was named by a visitor the Cathedral Pines, a name which most fittingly describes the beauties of the grove where the flickering sunbeams filter through the boughs as through the time hallowed windows of an old Cathedral. Thus we have now what has been appropriately called "The Hillside City of Hope."

There is a large Administration building at one end of the camp used as a nurses' home and down stairs provided with the offices for the work of the Institution. A residence is also provided for the physicians and another double building in the Colonial style is to be begun at once for the superintendent and his family and the remainder of the medical staff. There are also seven small cottages formerly part of a private Sanatorium—the Mountain Side—which was added on last summer by the State to the present institution.

The water plant and the sewage disposal system have been built with the idea of the expansion of the institution and both are capable of caring for a camp of three thousand people.

When the infirmary is completed we shall be enabled to care for six hundred patients, though even these accommodation are far from being adequate to the demand upon us for help.

With the completion of our infirmary we will be able to classify our patients under the headings of incipient or hopeful cases, and those too ill to be helped and who have been in many instances cared for in our present camp with its primitive conditions of the last winter.

Our patients are not sent to us until after having passed the examination of the County Medical Inspectors; a great help to us for in this way many a case too ill for the condition of camp life is spared the hardship of a useless trip. It is for these cases that our Infirmary is designed; to give them a chance to spend their remaining days in comfort and to prevent them from being a source of infection to others.

The general line of work and treatment here is much the same as at any other Sanatoria for the outdoor treatment of tuberculosis. During the past winter and spring we have been treating a large number of cases with two lines of serum the result of years of experimental work on the part of Dr. Samuel G. Dixon, now the Commissioner of Health of Pennsylvania. Our results have been most gratifying and while over eighty cases have been thus treated, we have yet to see the first evil result therefrom. In no instance have we asked the patients to allow us to use it upon them; such requests must come voluntarily from the patients themselves and no one feels that she or he is being brought here and experimented upon. In fact so popular is the treatment that it is found difficult to keep the supply of serum up to the demand for its use.

One fact should have been mentioned earlier in the historical part of this article, namely—that during the first winter of the camp's existence it was only kept alive through the generous contributions of the Federation of Woman's Clubs of Pennsylvania. There was no money whatever to draw upon, and fuel and other necessities for the actual life of the camp came through this generous aid.

DEPARTMENT OF HEALTH SANATORIUM FOR TUBERCULOSIS AT MONT ALTO, PA.

Incipient and moderately advanced Cases. Report for the year ending May 31, 1908.

	Color.		Sex.		Civil Condition.		Total.
	W.	B.	M.	F.	M.	S.	
Number patients on the first of year, ...	14	1	9	6	6	9	15
Number patients discharged during the year,	81	1	56	26	30	52	82
Number patients discharged as disease arrested, ...	36	1	21	16	13	24	37
Number patients discharged as improved, ..	35	.....	30	5	15	20	35
Number patients discharged as unimproved,	10	.....	5	5	2	8	10
Number patients admitted during the year,	176	3	114	65	68	111	179
Number patients remaining to date, ...	109	3	67	45	45	67	112
Number patients showing increase in weight, ...	.....	.....	105	63	.....	.....	168
Number patients showing no change in weight, ...	.....	.....	12	5	.....	.....	17
Number patients showing loss in weight, ..	.....	.....	5	4	.....	.....	9

DEPARTMENT OF HEALTH SANATORIUM FOR TUBERCULOSIS AT MONT ALTO, PA.

Incipient and moderately advanced, Remaining Three Months or Less. Report for the year ending May 31st, 1908.

	Color.		Sex.		Civil Condition.		Total.
	W.	B.	M.	F.	M.	S.	
Number patients admitted during year, ...	40	.....	32	8	17	23	40
Number patients discharged during the year,	40	.....	32	8	17	23	40
Number patients discharged as disease arrested, ...	10	.....	7	3	3	7	10
Number patients discharged as improved,..	24	.....	20	4	12	12	24
Number patients discharged as unimproved,	6	.....	4	2	1	5	6
Number patients showing increase in weight, ...	.....	.....	27	7	.....	.....	34
Number patients showing no change in weight, ...	.....	.....	1	2	.....	.....	3
Number patients showing loss in weight, ..	.....	.....	2	1	.....	.....	3

DEPARTMENT OF HEALTH SANATORIUM FOR TUBERCULOSIS AT MONT ALTO, PA.

Far advanced or Infirmary Cases. Report for the year ending May 31, 1908.

	Color.		Sex.		Civil Condition.		Total.
	W.	B.	M.	F.	M.	S.	
Number patients on the first of year, 1907,	12	.....	4	8	1	11	12
Number patients discharged during the year,	58	1	40	19	26	33	59
Number patients discharged as improved, ..	19	.....	17	2	5	14	19
Number patients discharged as unimproved,	30	1	17	14	19	12	31
Number patients discharged by death, ...	9	.....	6	3	2	7	9
Number patients admitted during the year,	73	1	50	24	34	40	74
Number patients remaining to date, ...	27	.....	14	13	9	18	27
Number patients showing increase in weight, ...	.....	.....	31	3	.....	.....	34
Number patients showing loss in weight, .	.....	.....	25	15	.....	.....	40

DEPARTMENT OF HEALTH SANATORIUM FOR TUBERCULOSIS AT MONT ALTO, PA.

Far advanced or Infirmary Cases, Remaining Three Months or Less. Report for the Year Ending May 31, 1908.

	Color.		Sex.		Civil Condition.		Total.
	W.	B.	M.	F.	M.	S.	
Number patients admitted during year, ...	37	.....	26	11	18	19	37
Number patients discharged during the year,	37	.....	26	11	18	19	37
Number patients discharged as improved, ..	6	.....	5	1	3	3	6
Number patients discharged as unimproved,	22	.....	15	7	14	8	22
Number patients discharged by death, ...	9	.....	6	3	2	7	9
Number patients showing increase in weight, ...	.....	.....	6	1	.....	.....	7
Number patients showing no change in weight, ...	.....	.....	3	3	.....	.....	6
Number patients showing loss in weight, ..	.....	.....	15	9	.....	.....	24

COUNTIES FROM WHICH PATIENTS WERE RECEIVED.

	Male.	Female.
Adams, ...	1	2
Allegheny, ...	6	5
Armstrong, ...	4	..
Berks, ...	1	..
Blair, ...	4	5
Bucks, ...	4	..
Butler, ...	2	1
Cambria, ...	7	6
Carbon, ...	2	..
Centre, ...	1	2
Chester, ...	11	8
Clarion, ...	3	1
Clearfield, ...	1	..
Crawford, ...	1	..
Cumberland, ...	4	4

COUNTIES FROM WHICH PATIENTS WERE RECEIVED—Continued.

	Male.	Female.
Dauphin,	24	19
Delaware,	1	7
Erie,	5	3
Franklin,	4	5
Huntingdon,	..	1
Jefferson,	1	..
Lancaster,	5	2
Lawrence,	1	..
Lebanon,	2	..
Luzerne,	1	1
Lycoming,	..	3
McKean,	..	1
Mifflin,	2	2
Montgomery,	9	..
Northampton,	2	..
Northumberland,	1	2
Perry,	7	1
Philadelphia,	45	13
Schuylkill,	1	..
Somerset,	1	2
Tioga,	5	2
York,	9	5

OCCUPATIONS OF PATIENTS.

	Men.	Women.
Seamstress,	..	5
Florist,	1	..
Housewife,	..	52
Housewife (domestic),	..	2
Teamster,	6	..
Bartender,	3	..
Textile worker,	3	..
Kennelman,	1	..
Miner,	6	..
Nurse,	..	4
Telegraph operator,	1	..
Laundryman,	1	..
Designer,	1	..
Electrician,	3	..
Boxmaker,	..	2
No occupation,	..	1
Painter,	4	..
Bookkeeper,	4	3
Lather,	1	..
Cooper,	2	..
Waiter,	1	..
Silk weaver,	..	2
Draftsmen,	2	..
Bricklayer,	2	..
Iron worker,	6	..
Laborer,	14	..

OCCUPATIONS OF PATIENTS—Continued.

	Men.	Women.
Stone cutter,	2	..
Clerk,	11	1
Mill worker,	3	6
Machinist,	14	..
Salesman,	2	..
Printer,	3	..
Motorman,	2	..
Railroad hostler,	2	..
Student,	6	2
Tanner,	1	..
School child,	3	8
Shoe cutter,	1	..
Priest,	1	..
Yardmaster,	1	..
Linotype operator,	2	..
Barber,	2	..
Merchant,	3	1
Farmer,	5	..
Druggist,	1	..
Plasterer,	1	..
Newsboy,	2	..
Chemist,	1	..
School teacher,	2	3
Broommaker,	2	..
Undertaker,	2	..
Accountant,	1	..
Cigar maker,	2	..
Musician,	2	..
Fireman (city fire service),	1	..
Electrician,	2	..
Railroader,	1	..
Hotel keeper,	1	..
Blacksmith,	2	..
Child's nurse,	..	2
Sugar refiner,	1	..
Retired,	1	..
Patternmaker,	2	..
Decorator,	1	..
Painter,	4	..
Stenographer,	..	3
Cartoonist,	1	..
Miller,	1	..
Milliner,	..	1
Salvation Army officer,	1	..
Train conductor,	1	..
Foundry boss,	1	..
Carpenter,	1	..
Jeweler,	1	..
Showman,	1	..
Private secretary,	..	1
Physician,	1	..
Dyer,	1	..

OCCUPATIONS OF PATIENTS—Continued.

	Men.	Women.
Weaver,	1	1
Boiler maker,	1	..
Railway mail clerk,	1	..
Glass worker,	2	..
Tailor,	2	..
Elevator boy,	1	..
Rigger,	1	..
Sailor's apprentice, U. S. N.,	1	..
Chambermaid,	..	1
Newspaper carrier,	1	..
Livery stable manager,	1	..
Lineman,	1	..
Engineer,	1	..
Glass blower,	1	..

THE DETECTION OF BACILLUS TYPHOSUS IN THE WATER SUPPLIED TO THE CITY OF SCRANTON.

Scranton's typhoid record for the earlier half of the year 1906 was a remarkably clean one and the few cases of the disease which occurred could easily be attributed to importation. In the month of August, however, a trifling increase was noticed by the Department of Health in the typhoid returns from the city, and for the next two months there was a constant, though comparatively slight, unusual prevalence of the affection, indicating the presence of some disturbing condition. No alarm was felt, however, by the citizens or the local authorities until December 7, when there was a sudden and startling rise in the number of cases. By the middle of the month it was evident that a serious epidemic was under way. On the 13th, thirty-three cases were reported as having occurred in the last twenty-four hours. There could be no doubt as to the true nature of the disease as a large percentage gave a positive Widal reaction. A medical and an engineer inspector of the Department were at once commissioned to visit Scranton, put themselves in communication with the local board of health and other city authorities and endeavor to discover the origin of the outbreak. Our representatives reported that one hundred and thirty cases had occurred in six days and that the fact had developed that all of the cases had been found in a section supplied from one only of the three reservoirs which furnish the city with its drinking water.

The local authorities had accordingly taken the precaution to shut off this source, known as the Elmhurst Reservoir. The increase in the number of cases was now very rapid, so that by January 5, 1907, it had reached 1010 in the city and 18 in the adjoining borough of Dunmore, evidently due to the same source.

No antecedent case of fever could be discovered on the watershed. An examination of the water itself, therefore, became of pressing importance and arrangements were made at the Department of Health laboratories by Dr. Herbert Fox, chief of the laboratories, and First Assistant Rivas, for the immediate bacteriological investigation of a large number of samples. The following is in part the report of their work submitted February 1, 1907.

On December 12, there were received from Dr. F. F. Arndt, bacteriologist of the Scranton Board of Health, two samples of water from the reservoir and one sample of sewage.

The sewage was collected on its escape from a hotel in the village of Moscow where it flowed into Roaring Brook, and from the stream into Elmhurst Reservoir. No colon was found in the water samples. That in the sewage of course was of interest simply as showing a possible source of pollution of the reservoir.

From our own inspectors were received December 19, four samples; December 21, fifteen samples; December 29, four samples; January 7, six samples; January 16, twenty-four samples; January 28, three samples; January 31, eight samples; February 1, nine samples; February 4, eight samples; February 7, six samples; February 8, six samples; ninety-three samples in all. These samples were collected from ten reservoirs, one creek, seven brooks, one watering trough, two taps at hotel, two at restaurants and one at the city hall. Those from the reservoirs were taken in different situations and at different depths, and at gate houses, screen chambers and spill ways.

All of them were received from the Department's inspectors in glass stoppered bottles, which varied in content from one to five ounces. They were all received in containers and packed well with ice.

The methods of examination used in the determination of bacteria in these samples consisted in planting quantities of one cubic centimeter of the raw water, or in making dilutions when it appeared that the water contained many bacteria. Agar-agar was used entirely, and the plates were incubated at 37 degrees C. for forty-eight hours for the determination of the number of bacteria per cubic centimeter. One cubic centimeter of the raw water was also plated in litmus lactose agar with about one per cent. Parietti's solution and incubated at 37 degrees C. for twenty-four hours, to discover

contamination of the bacillus coli. These plates were fished at the end of twenty-four hours and grown in dextrose broth, and those showing fermentation were studied further for the determination of the bacillus coli. After these quantities were removed from the original bottle of raw water, the remainder of the water in each bottle was poured into flasks containing double strength bouillon in about equal quantities, and to this mixture about one per cent. Parietti's solution was added. Unfortunately the water in these bottles was not measured, so we can not report on the exact quantity of water, but as the bottles averaged about three ounces (about equal to 100 cubic centimeters), we have spoken of the bacillus coli content of that quantity. These plates were fished at the end of twenty-four hours, and the routine examination of the bacillus coli made.

Being mindful of the epidemic of typhoid fever in Scranton, we were on the lookout for the bacillus typhosus, and from the plates made of the large bulk of water grown in double strength bouillon, we fished about one hundred colonies which were suggestive of that organism, being small and blue or violet. Of this hundred, four grew diffusely upon dextrose broth without the production of gas, and were accepted as suspicious. These cultures came from (1) number 7 reservoir surface at Spillway, laboratory number, 97-a, (2) brook just below hotel sewer at Moscow, laboratory number, 100, (3) Roaring Brook just below bridge, Mill St., Moscow, laboratory number, 103, (4) Van Brunt Brook just below run leading from Moscow cesspool, 108. (These cultures will hereinafter be mentioned by their laboratory numbers.)

The culture, Lab. No. 97-a, was proven to be identical with the bacillus typhosus, biologically, morphologically and in its serum reactions. This culture will be described later on.

The culture, Lab. No. 100, reacted with blood of one patient on two occasions, and was biologically strongly suggestive of bacillus typhosus, except in milk, where the alkalinity ruled out such a determination. Since this time, the organism has not reacted to anything, and has unfortunately been lost by contamination.

The culture from Lab. No. 108 was biologically like the bacillus typhosus, is nonmotile and does not react to any blood.

The culture 103, in many ways suggestive of bacillus typhosus, reacted to three samples of blood from typhoid patients, but does not produce a serum after injection into rabbits which will agglutinate either the bacillus typhosus or culture from Lab. No. 97-a, now to be described.

REPORT OF THE CULTURE FROM LABORATORY, NUMBER 97-A.

The following is a report of the bacteriological examination of the culture obtained from the water sent to us labeled "No. 2, Spillway of dam No. 7," in a series of samples sent on December 21, 1906. This sample was subjected to the same routine examination as the other samples, according to the method outlined above. On the plates made from the bulk of the water which was incubated with double strength bouillon, about 200 blue colonies were found. Fifteen of the most suspicious of these colonies were transferred to dextrose broth and fermentation tubes. One of these fifteen showed a diffuse, even turbidity with no gas, no excessive growth on the bottom of the bulb, and proved to be a motile organism, negative to the Gram stain. The other fourteen tubes were easily excluded from consideration. This one very suspicious tube was transferred to the various culture media, and the following is a detailed account of its growth.

The organism was negative to Gram stain, stained rather diffusely with Loeffler's, and all stains showed a short, rather plump rod, with rounded ends, sometimes present in filamentous forms. They were actively motile, with a typical wiggle.

On agar slants, there grew a pale, even, smooth, regular veil-like grayish blue streak on the surface.

Agar plates presented small, smooth, even regular, round entirely superficial colonies, having bluish gray color by reflected light; in the depth round or whetstone shape, finely granular, yellow brown colonies. Practically the same colonies were present on gelatin, except that they were more finely granular, the radial lines were not clear, and the nuclei were central or slightly eccentric. No liquefaction.

Gelatin tube: after forty-eight hours, there was a pale, whitish growth along the stab, with flat smooth surface growth, showing a little tendency to spread. No liquefaction.

Lactose litmus agar tubes: the medium has a violet color after twenty-four hours, with a slight, smooth, bluish growth on the surface, but no gas and no red color. No gas in lactose litmus bouillon.

Lactose neutral red tube: there is a growth along the stab and along the surface as above. Medium has slightly deeper red color.

Milk: At the end of twenty-four hours, the first change was seen, the medium being slightly violet or lilac, which is more marked at the end of forty-eight hours, but does not increase thereafter. There is at no time any viscidity of the milk.

Potato (acid): There is a very faint moist colorless growth on this medium.

Bouillon and peptone water: Even turbidity, more marked in the former; no pellicle and no indol after a growth of eight days.

Conradi-Drigalski plates: Stroke plates showed small, bluish, round, regular, even end entire colonies, the largest being three millimeters in diameter at the end of forty-eight hours.

HIS tube: Growth along the stab quite clear, extension into the medium very faint. No gas by stirring with the rod.

HIS plates: The colonies on the surface showed typical granular center, with thready outgrowths.

Serum Tests. On January 2, this culture reacted positively in dilutions of 1-50 and 1-100 with three samples of blood collected from typical typhoid fever patients in the Hospital of the University of Pennsylvania; controls made with the bacillus typhosus made at the same time were found to be positive.

On January 5, we obtained three samples of blood from Dr. F. F. Arndt, bacteriologist of the city of Scranton, and five specimens from new cases from the Hospital of the University of Pennsylvania. From these bloods were obtained five positive reactions with the bacillus typhosus, and with the culture from Lab. No. 97-a. The bloods which were negative to the bacillus typhosus were liewise negative to this culture.

On January 8, these bloods were retried with exactly the same results. This culture was then tried with normal blood, and both it and the bacillus typhosus were negative in dilution of 1-10 and 1-50, even after the lapse of one hour.

Rabbits were immunized with the bacillus typhosus, culture from Lab. No. 97-a and with culture from Lab. No. 103. They were injected with dead cultures and then with minute quantities of live cultures, ten days apart. They received in all three inoculations. Our preliminary agglutination test, set ten days after the second injection, showed that the serum from the rabbit injected with bacillus typhosus agglutinated the homologous organizm in dilutions of 1-10 and 1-100, the latter reaction occurring promptly and clearly at the end of twenty minutes. This same serum clumped the culture from Lab. No.97-a in dilutions of 1-10 and 1-100, the latter reaction being complete and typical at the end of twenty minutes. This antityphoid serum did not react in dilutions of 1-10 and 1-100 with culture from Lab. No. 103.

The animal which had been injected with 97-a was bled at the same time, and the serum agglutinated this culture, that is, 97-a, in dilutions of 1-10 and 1-100, the latter being prompt and positive when observed after twenty minutes. This same serum agglutinated the bacillus typhosus in dilutions of 1-10 and 1-100, the latter reactions being typically positive when observed after twenty minutes.

This serum from the rabbit injected with the culture from Lab. 97-a did not clump the culture 103.

The serum from the rabbit injected with culture Lab. No. 103 agglutinated the homologous bacterium in dilutions of 1-10 and 1-100, but had no effect in dilutions above 1-10 upon the culture Lab. No. 97-a, or bacillus typhosus.

The microscopical method of agglutination test was used, and the controls in all cases were free of clumps and actively motile. The time limit of ten minutes was set for dilutions of 1-10 and when dilutions were 1-100, no reaction was considered positive that did not appear within ninety minutes.

Ten days after the third injection, the rabbits were again bled, and on this occasion we determined the limit of agglutination value of each serum for its own culture, and the heterologous bacillus. We determined primarily by the microscopic method, that each serum would react with its own, and with the other organism rapidly in dilutions of 1-400. (See Chart No. 1.) The test for the limit of dilution which would give a positive reaction was set by the macroscopic method, and it was found that the serum from the rabbit injected with the bacillus typhosus would agglutinate that organism in dilutions of 1-6000, while the serum from the rabbit injected with culture 97-a would agglutinate its native bacterium in dilutions of 1-4000, and questionably in dilutions of 1-5000. The limit of agglutination of each serum with the heterologous bacterium was then tried, and it was found that the antityphoid serum would react with the culture from Lab. No. 97-a in the dilution of 1-4000, and that the serum from the rabbit injected with culture Lab. No. 97-a would react with the bacillus typhosus in dilutions of 1-3000.

After having discovered that each serum would agglutinate the homologous and heterologous organisms in high dilutions, it was natural to suppose that the heterologous organism would absorb all or nearly all the agglutinin produced by the homologous organism, and therefore reduce the limit of the dilution value for the latter. The dilutions of the 97-a and bacillus typhosus antisera to

which the heterologous organism had been added, to determine the heterologous agglutination limit, were centrifuged to free them of all bacteria. These, then, were respectively the proper dilutions of the typhoid antiserum in which the agglutinin had been absorbed by the culture from Lab. 97-a, and of the 97-a antiserum, the agglutinin of which had been absorbed by the bacillus typhosus. Having removed the heterologous bacilli from the absorbed dilutions, very small quantities (1 drop in 2 c.c. dilution) of a thick emulsion made in salt solution from twenty-four hour old agar slants of the respective bacteria, were added to their native sera. (See Chart No. 2.)

It was found by this that the culture 97-a had absorbed sufficient agglutinin from the antityphoid serum to reduce the agglutinin limit of that serum for the bacillus typhosus from 6,000 to 100. Controls of the anti-typhoid serum which had been preserved in dilution (therefore about twenty-four hours old) reacted with the bacillus typhosus positively in dilutions of 1-400, and questionably in dilutions of 1-5000. It seems, therefore, from this experiment that the culture from Lab. No. 97-a is capable of absorbing nearly all the agglutinin produced in rabbit serum by the bacillus typhosus.

In order to determine whether the bacillus typhosus could absorb the agglutinin produced in rabbit serum by injection of 97-a culture, complimentary tests were set. It was discovered that the 97-a antiserum would clump the bacillus typhosus to the dilution of 1-3000, but when this serum was centrifuged and mixed with its homologous culture, the agglutinin limit for this culture, that this culture, that is, 97-a, had been reduced to 1-200. Controls, as before, made from the twenty-four hour old dilutions of 97-a antiserum showed that these dilutions still reacted to the limit of 1-3000, with 97-a culture. It therefore seems that the bacillus typhosus can absorb most of the agglutinin produced in the serum of rabbits by the culture of 97-a.

Time limit of sixteen hours was established for all these macroscopic experiments.

There are in the laboratory, four cultures determined to be the bacillus typhosus, and four cultures suspected of being the same. The serum produced by the injection of culture from Lab. No. 97-a was tried wtih these eight, and the 97-a culture, with the bacillus paracolon, bacillus paratyphosus, and with the culture Lab. No. 103. The results obtained are presented in Chart No. 3. 1, 3, 4 and 5 are determined strains of bacillus typhosus, while 6, 7, 8 and 9 are at present under examination as belonging to the bacillus typhosus group. It will be noted that this antiserum of 97-a agglutinated also the paracolon organism (bacillus enteritidis Gärtner) but not the bacillus paratyphosus. Upon the culture from Lab. No. 103, this serum has no effect.

From the results of the biological and morphological characters, the agglutination experiments, and the absorbing ability of this culture from Lab. No. 97-a for the anti-typhoid agglutinin, it seems justifiable to call this organism the bacillus typhosus.

Respectfully submitted,

HERBERT FOX,
Chief of the Laboratories.

D. RIVAS,
First Assistant in the Laboratories.

The conclusion reached by Drs. Fox and Rivas must be that of every experienced bacteriologist. The fact that they met with success in a quest where so many have failed, is due possibly not so much to superior skill as to the fact that they happened to receive

SERUM TESTS WITH ANTISERA OF TYPHOSUS AND 97-A SCRANTON CULTURE.
CHART NO. 1.

Typhoid serum+ bac. typhosus,	++	++	15″ +	O	97-a serum, bacillus typhosus,	++	++	20″ +	O
Typhoid serum+ 97-a,	++	++	+	O	97-a serum, 97-a culture,	++	++	+	O
Dilution,	1-10	1-100	1-400	C		1--10	1-100	1-400	C

Time limit 1-10, 10 minutes; 1-400, 4 hours; 1-100, 90 minutes.

CHART NO. 2.
LIMITS OF AGGLUTINATION WITH HOMOLOGOUS AND HETEROLOGOUS SERA AND ABSORPTION.

A-Typhoid Serum. Rabbit. Dilution.	10	50	100	200	400	600	800	1000	1200	1400	1600	1800	2000	2500	3000	4000	5000	6000	7500	10001	C
Typhoid serum+ bacillus typhosus,	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	—	—	O
Typhoid serum+ 97-a (absorption),	+	+	+	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—			O
Typhoid serum+ bac. typh. (after absorption),	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	—	—			O
Typh. ser.+ bac. typh. (serum 24 hrs. old),	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	—			O

B—97-a Serum. Rabbit. Dilution.	10	50	100	200	400	600	800	1000	1200	1400	1600	1800	2000	2500	3000	4000	5000	6000	7500	10001	C
97-a serum+97-a culture,	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	?	—			O
97-a serum+bac. typhosus (absorption),	+	+	+	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—			O
97-a serum+ 97-a (after absorption),	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	—	—	—			O
97-a serum+ 97-a (serum 24 hr. old),	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	—	—	—			O

Time limit for all dilutions 16 hours.

CHART NO. 3.
97-A ANTISERUM WITH DIFFERENT CULTURES.

No.	Name.	Dilution.	Result.	Time Limit.	Control.
1	Typhoid,	1-500	+	20 min.	Good.
2	97-a,	1-500	+	20 min.	Fair, few clumps.
3	Flexner,	1-500	+	20 min.	Good.
4	F-1,	1-500	+	40 min.	Good.
5	F-2,	1-500	+	20 min.	Good.
6	Hunt,	1-500	+	35 min.	Good.
7	Wainwright,	1-500	+	20 min.	Good.
8	264-1,	1-500	+	35 min.	Good.
9	264-2,	1-500	+	35 min.	Good.
10	B. paratyphoid,	1-500	—	3 hrs.	Good.
11	B. paracolon,	1-500	+	1 hr.	Good.
12	103,	1-500	—	3 1-2 hrs.	Good.

samples containing an unusual number of typhoid organisms, to the large number of samples furnished, and to the industry and pertinacity of their search. The practical value of their discovery can not be overestimated, as it enabled the Department of Health to declare with absolute authority that which it had before asserted inferentially, that the water shed was polluted, and, further, to point out the precise place in the particular reservoir where the pollution was detected. From this resulted the complete co-operation of the city authorities and the water company with the department in its efforts to remove every source of pollution from this large water shed of fifty-nine square miles, and to thoroughly cleanse the entire system from dangerous organisms.

I may state that not less than five hundred separate sources of pollution, ranging from a hotel sewer to a piggery, were discovered and removed, and this in a mountainous country, in zero weather, with the ground frozen to the depth of eighteen inches and often covered with a foot of snow.

AN ORDER ISSUED BY THE COMMISSIONER OF HEALTH OF THE STATE OF PENNSYLVANIA FOR THE SANITARY PROTECTION OF THE WATERS USED BY THE SCRANTON GAS AND WATER COMPANY FOR THE SUPPLY OF WATER TO THE PUBLIC IN THE CITY OF SCRANTON AND ITS IMMEDIATE VICINITY.

Section 1.—No cesspool, privy, or other place for the reception, deposit, or storage of human excrement, and no urinal or water closet shall be located, constructed or maintained within 50 feet of the high water mark of any lake, pond, reservoir, stream, ditch, water course, or other open waters used by the Scranton Gas and Water Company, as a source, or for the conveyance, storage or dis-

tribution of the water supply of the city of Scranton or its immediate vicinity, or within 50 feet of the high water mark of any lake, pond, reservoir, stream, ditch, water course, or other open waters, the water of which flows directly or ultimately into any waters so used by the Scranton Gas and Water Company.

Section 2.—No human excrement shall be deposited or discharged in or into any lake, pond, reservoir, stream, ditch, water course, or other open waters, used either directly or indirectly by the Scranton Gas and Water Company, for the supply of water to the public in the city of Scranton or its vicinity; and no human excrement shall be kept in, deposited or discharged in or into any cesspool, privy, or other receptacle situated within 250 feet of the high water mark of any open waters so used directly or indirectly by the Scranton Gas and Water Company, unless such cesspool, privy, or receptacle is so constructed that no portion of its contents can escape or be washed into any such waters.

Section 3.—No human excrement, or compost containing human excrement, or contents of any privy, or cesspool or sewer or other receptacle for the reception or storage of human excrement, shall be deposited or discharged upon or into the ground at any place from which any such excrement, compost or contents, or particles thereof, may flow or be washed or carried into any lake, pond, reservoir, stream, ditch, water course, or other open waters used by the Scranton Gas and Water Company, as a source, or for the conveyance, storage or distribution of the water supply of the city of Scranton, or its immediate vicinity, or into any of such waters of the State, the water of which flows directly or ultimately into any waters so used by the Scranton Gas and Water Company.

Section 4.—No house slops, sink wastes, water which has been used for washing or cooking, or other polluted water, shall be discharged directly or indirectly into any lake, pond, reservoir, stream, ditch, water course, or other open waters used by the Scranton Gas and Water Company as a source, or for the conveyance, storage or distribution of the water supply of the city of Scranton, or its immediate vicinity, or into any such waters of the State, the water of which flows directly or ultimately into any waters so used by the said Water Company; no house slops, sink water, water which has been used for washing or cooking, or other polluted water, shall be discharged into the ground within 50 feet of the high water mark of any open waters so used by the said Company, or of any open waters flowing as aforesaid into the waters so used by the said Company, and not then, unless such discharge into the ground be so arranged that no portion of it can escape to the surface of the ground and be washed into any such waters.

Section 5.—No garbage, manure or putrescible matter, whatsoever, shall be put into any lake, pond, reservoir, stream, ditch, water course, or other open waters used by the Scranton Gas and Water Company, as a source or for the conveyance, storage, or distribution of the water supply of the City of Scranton and its immediate vicinity, or into any such waters of the State, the water of which flows directly or ultimately into any waters so used by the said Water Company; and no garbage, manure, or putrescible matter, whatsoever, shall, except in the cultivation and use of the soil in the ordinary method of agriculture, be put upon the ground within 250 feet of the high water mark of any open waters so used by the said Water Company, or of any open waters indirectly so used by the said Company, nor on said ground beyond said limits, unless precautions are taken that prevent any portion of such matter to escape or be washed into any such waters.

Section 6.—No stable, pig sty, hen house, barn yard, hog yard, hitching or standing place for horses, cattle or other animals, or other places where animal manure is deposited or accumulates, shall be located, constructed or maintained, any part of which is within 50 feet of the high water mark of any lake, pond, reservoir, stream, ditch, water course or other open waters used by the Scranton Gas and Water Company, as a source, or for the conveyance, storage or distribution of the water supply for the city of Scranton or its vicinity, or the waters of the State, the waters of which flow directly or ultimately into any waters so used by the said Water Company, and no stable, or other place as above enumerated, shall be located, constructed or maintained on any ground, the surface drainage of which is either directly or indirectly into the aforesaid waters so used by the said Water Company, unless suitable and adequate provisions are made to prevent any manure or other polluted matter from flowing or washing into such open waters.

Section 7.—No manufacturing refuse, or waste product, or polluting liquid or other substance of a nature poisonous either to human beings or animals, or other putrescible organic matter, whatsoever, shall be discharged, directly or indirectly into or at any place from which it may flow or be washed or carried into any of the open waters of the State used by the Scranton Gas and Water Company, as a source of supply to the public, or for conveyance, storage or distribution of the water supply of the city of Scranton and its vicinity.

Issued January 1st, 1907, and to remain in force until further order.

SAMUEL G. DIXON,
Commissioner of Health.

REPORT ON THE EPIDEMIC OF ACUTE POLIOMYELITIS IN NORTHWESTERN PENNSYLVANIA DURING THE AUTUMN OF 1907.

By HERBERT FOX, M. D., Chief of Laboratories, Under the Direction of the Department.

The first knowledge that poliomyelitis really existed in epidemic form in Pennsylvania came to the Department of Health when report was made of the appearance of twelve cases in the town of Eau Claire, north Butler county, during the last two weeks in September, 1907. Rumors of cases had come sometime previously from Ridgway, Elk county, but these tales were so confused with reports of existing cerebrospinal meningitis that little attention was paid to them. Acute anterior poliomyelitis is not included among those diseases which are to be reported as communicable, but from the experience gained in this epidemic, from a review of literature and because the disease is known to exist in an epidemic form in New York, it seems to the writer that there is as much justification for adopting some kind of hygienic control in this condition when epidemic as in spotted fever. While we now recognize a specific etiologic agent in cerebrospinal fever and other communicable diseases, they were guarded against before this was isolated, and we guard against some diseases whose causation is not yet known. This investigation was instituted by the Commissioner with the hope of establishing some fact or facts indicating the means of transmission, degree of communicability, and causation of this actue infantile palsy. Bacteriological and pathological materials were taken. The epidemic was on its ebb tide when I arrived, so that experimental work was possible in less than a score of children, although I could not gain family consent in a few other serviceable cases. The hearty support of the physicians deserves the thanks of the Department.

The first cases of which I could obtain reliable information occurred in Elk county, about the last of July or the first of August. A few cases occurred in Venango county a short time later. It might be added that efforts to connect these two counties and the individual cases yielded nothing of value. The disease then made its appearance in the center of Elk county at Ridgway. Thence it may be said to have jumped to Oil City, after which DuBois was visited, and, lastly, in Eau Claire twelve cases developed in two weeks. It must not be understood that these were the only places visited, for small villages and single outlying houses were attacked during this time, the number of these so-called sporadic cases probably equalling or exceeding that in the larger centers. I have records of one hundred and thirty-one cases in and around Eau Claire, Oil City, Ridg-

way and DuBois, and slight information of twenty-five to forty more in one region of Elk county, so that the epidemic was general. The territory through which the disease prevailed might be roughly bounded as follows: On the north by a line between Ridgway and Oil City; on the east by DuBois; on the south by a line east and west just north of Butler City, and on the west by New Castle near the Ohio line. The question bearing on the relation of these towns will be discussed under general hygiene, but the reader could easily satisfy himself of the relative position by a glance at a map of the State of Pennsylvania. This area is from 78° 45′ to 80° 15′ W. Long. and from 41° to 41° 30′ N. Lat.

If the epidemic be taken as a whole, it can be said that it had a gradual rise and a much more rapid fall. The earliest cases appeared in the midsummer; they then increased slowly and steadily in number until the last half of September when the greatest average was reached, after which a rapid subsidence occurred, so that at the first of November only a few scattered cases were reported. The individual centers in which the disease broke out had a somewhat different experience. The first place studied, Eau Claire, for instance, was stricken suddenly and nine persons were taken sick within eight days, after which a slow decline was observed. In Oil City the rise was quite slow, with its high point about the first week in October, and then a slow decline. In Ridgway a slow onset, slow progress with no definite high point and a rapid cessation, outlines the course of the epidemic. In DuBois there may be said to have been two outbreaks; the first in September, the second late in October, the latter being succeeded by a rapid disappearance of the disease. Such a course as outlined for the epidemic as a whole seems to indicate a dependence upon some condition consequent upon the advancing summer and approaching autumn. Moreover, the different behavior, and indeed the different times of the individual outbreaks, whose locations are geographically comparable, do not point in the same direction. The fulminating outbreak at Eau Claire, and the slow progress at Ridgway, would not seem an expression of the same determining factor. Some reference will be made to this under another heading.

CLINICAL CONSIDERATIONS.

The primary desideratum was of course to establish the diagnosis. This appeared difficult from reports and the first few examinations. It was a current belief with the laymen and some of the physicians that we were dealing with a form of spotted fever. This idea was not unfounded because of the frequency of meningeal symptoms to a greater degree than observed in the usual sporadic case of acute infantile palsy. The incubation symptoms and period strengthened

the belief. The absence of reflexes in the affected area, the presence of palsy, absence of eye signs and infrequency of delirium soon directed the decision against cerebro-spinal meningitis.

I will briefly outline the average clinical course and variations, the latter appearing to have great importance in hygiene. The child will go to bed in its usual health, but during the night may be noted as somewhat restless. In the morning, nothing abnormal may be observed, but during the day the child will complain of being tired; it is quiet, perhaps somnolent when undisturbed, but nervous and peevish upon the slightest molestation; the pupils may be dilated and the conjunctiva glassy and sensitive to light at this time. The tongue is probably not yet coated, but soon becomes so, and the papillae of the anterior half are red and prominent. This tongue I have called an atypical strawberry tongue. At night the child will have fever, sleep fitfully and awaken several times peevish or crying. Vomiting or convulsions are occasionally encountered at the onset. During this time constipation exists, and often forty-eight hours elapse without a bowel movement; this constipation may be unaffected until an enema is employed to assist after the exhibition of a reliable cathartic. This speaks for a paresis of the bowel. In a few instances, diarrhea is reported, but whether this were true looseness or due to the constipation, I was unable to decide from the histories. Urine not infrequently is retained, and voided perhaps not oftener than twice daily, or even less. The bladder is usually full, however, and later urine is free; therefore, the paresis or atony of the bladder appears early and is transient. The reflexes of the foot, knee, abdomen and eye are not disturbed at this time. On the third day, there may be an improvement and the fever, which has been moderate, averaging 102 deg. F., will begin to subside. During the day before the fever subsides, or when it is at its height, general aches and pains are noted, especially referable to the head, neck, shoulders and legs, not often the thighs. With the decline of fever, this symptom improves only to reappear a day or so later. When the patient cannot express pain, it will cry on passive movement, and must also be turned frequently to be comfortable. The child lies by preference, partly on the back and partly on the side, with the legs and thighs flexed and the head thrown slightly backward. The posterior cervical muscles are frequently stiff, which sign appears just before the palsy in the average case. Pressure over them and along the vertebrae may sometimes elicit tenderness at this stage, and almost always a day or so later. As the temperature subsides, a paresis of the parts to be affected appears, which is rapidly succeeded by paralysis. When the paralysis is well established, the constitutional signs and symptoms rapidly clear up and the child's appetite returns. The soreness and pain may persist for some days.

Physical examination of the trunk during the acute stage discovers an enlarged spleen in fifty per cent. of the cases, which persists for a week. Otherwise, physical examination is usually negative. Occasionally tympanites may be present. The paralysis of course is accompanied by complete loss of reflexes in the respective members. Tache Cerebrale was present in a small percentage of the acute cases which I saw. Kernig's sign is rarely present, except in the fulminating cases next to be described. It is always noted when the symptoms of meningeal irritations are greatest. The general course differs from the sporadic case in its slowness of development, early evidences of pain and other meningeal symptoms. The average duration of the constitutional conditions was four days.

Another type of case suggests Landry's Paralysis, and was fulminating in its progress, the initial symptoms perhaps developing in twenty-four to thirty-six hours accompanied by complete paralysis and ending in death within seventy-two hours from the onset. Two cases may be cited in detail in illustrate this type.

Case 12, H. K., eleven years. Five brothers and three sisters. Family and personal history negative. This boy lived in the town of Eau Claire during the school week and spent Sunday with his family, about a quarter mile out of town in a valley. During the week of 9-20, he had complained frequently of headache and abdominal distress, which was ascribed to dietetic indiscretions and relieved by cathartics. This is the only case among the fatal ones in which I can obtain a clear history of dietetic indiscretions. October 8th he complained of severe headache and backache and had fever, but this was better on the following morning. That day he was put to bed and the general condition was worse at night. There were no catarrhal symptoms at any time. There was almost absolute retention of the bowels. The pupils were dilated, but the conjunctive was not injected. On October 10th, paresis of the legs, followed closely by that of the arms, was observed, which proceeded into paralysis in the afternoon of the same day. During the night of 10-10, respiratory paralysis occurred, and from then until death respiration was carried on by the cervical muscles. The eyes at this time were widely open, dry, perfectly straight, the pupils were dilated and reacted to light and distance. The child was uncomfortable by reason of general pains and aches, which appeared very shortly after the onset. There was no pain on pressure over the spine, but the dorsal and lower cervical vertebrae were tender when struck by the finger. The liver and spleen and thorax were negative. Retraction of the head was first observed on the morning of the 10th, but this retraction was more a matter of comfort than spasticity. Kernig's sign present. After midday on the 11th, dyspnoea became worse, respiration assumed the Cheyne-Stokes type; mild active delirium set in

and death occurred that same afternoon. Post mortem limited to the brain and cord, done 18 hours after death. Fluid had been injected into the cavities by the undertaker. Lumbar puncture resulted in a dry tap. Blood stains were noted beneath the skin all over the body, giving rise to the suspicion of spotted fever. No such condition could be discovered. The cord in the meninges seemed entirely normal, while the membrane was smooth and pale. The spinal fluid could not have amounted to more than 1 c.c. Cultures were taken from beneath the dura, just below the fourth vertrical and smears were also made from this fluid. The dura of the brain was closely adherent to the skull and to the pia of the central surface of the left hemisphere. The longitudinal sinus was very full of dark fluid blood, and its walls were closely attached to the pia of the internal surface of the hemispheres. The pia of the left hemisphere along the longitudinal fissure was cloudy and congested. At no other point, including the base, was the pia affected. No opacities along the vessels. Cultures and smears were taken from the cloudy pia and the subjacent brain. Cultures taken from the lateral ventrical, nose and throat; the eyes and ears had been handled too much.

Pathological sections of this brain and cord showed typical lesions of poliomyelitis. The spaces around the cells of the anterior horn contained thrombi, around the edges of which was an excess of mononuclear cells, apparently of the lyphoid type. The pia and subpail layer of the cord, medulla and pons were the seat of infiltration of lymphoid cells of the same type seen around the motor cells. The process involved the cord, bulb and pons, while the gray matter of the cerebrum and cerebral pia was markedly congested. This brain, with some other work on the pathology of this condition, will form the basis of a later paper. The cytological studies upon smears made from various parts of the brain surface were quite unsatisfactory. The slides showed only a very few cells, perhaps two dozen, on a large smear, and these were almost entirely large regular mononuclear cells with a large nucleus and narrow protoplasm. A few polymorphonuclears were also encountered. Preparations fixed and stained in many different ways failed to show any trace of protozoa, cellular inclusion or intracellular bacteria. A gram positive diplococcus was found in cultures from the fourth ventricle and longitudinal fissure. This will be discussed later.

Case 19, R. H., four years. Personal and medical history negative. House and family hygiene, good. First taken sick October 16th A. M., by sleepiness and vomiting after taking a glass of milk. Temperature in the middle of the afternoon 101 deg. F. Bowels absolutely constipated after 10.16 a. m. until death. Tongue was dry, covered with a whitish coating and there were a few small promin-

ent papillae. The afternoon of October 16, stiffness of the neck with retraction was noticed. There were no convulsions at any time. Tenderness in extremities and back was noted in the evening, and the child was very peevish and restless during the afternoon and night. The pupils were moderately dilated, conjunctiva normal. When first seen, there appeared to be some weakness of the legs, but this could not be determined definitely because of the child's irritability. October 17, considerable depression, greater prominence of the above described symptoms, distinct palsy of the legs. Oct. 18, absolute paralysis of all extremities and thorax with marked dyspnoea was noticed. Respiration became Cheyne-Stokes at 4 p. m., and the child died about 8 p. m. There was Kernig sign but no tache. Pain was an inconspicuous symptom probably because of the great depression of the child on the second day. Three hours before death, 10 c.c. of a clear fluid was removed at the second lumbar space, and after its withdrawal the general condition improved for about half an hour. The family would not consent to a repetition of the procedure. The pulse was strong until death, averaging about 120. Post mortem was refused.

The first case fails to show the excess of fluid causing pressure with its accompanying symptoms, which the second case demonstrates quite clearly. In one three-year old child, which died in sixty hours after the onset, 20 c.c. of clear fluid was obtained at the second space, directly after death. Autopsy refused. These are practically the same as Landry's Palsy, with evidences of excess of cerebro-spinal fluid and meningeal irritation. In one case which I saw during its entire course (72 hours), the knee reflexes were not increased during the first day, while there was no palsy, which fact seems to me to indicate that meningeal irritation was not great at that time, especially in the absence of pressure symptoms and certainly the membranes were not sufficiently affected to determine a meningitis. This particular case supplied eighteen cubic centimefers of a clear limpid fluid on lumbar puncture.

The palsy of these cases occurred rapidly, affecting perhaps the entire body within twenty-four, apparently in an ascending direction. Among thirty-five cases in all, which were examined personally, five were fatal, four of this number presenting the picture illustrated above. One case, which improved, exhibited general paralysis with paresis of the respiratory muscles, the latter rapidly improving after becoming well marked. In the typical case, the pain appeared before the palsy; this might be interpreted by the description of Harbitz and Scheel (J. A. M. A., October 26th, 1907) that the pia is the seat of injection and infiltration quite early. They maintain that the process progresses inward, beginning in the membrane and affecting the entire cord, with the greatest evidences, how-

ever, in the gray matter. In considering these fulminating cases, it would seem probable that the membrane and cord are affected almost simultaneously for the pressure symptoms and palsy appear almost at the same time.

If we consider the typical and fulminating types, it is evident that the infection may attack any part of the nervous system. According to the pathological studies of Harbitz and Scheel, this actually occurs. They find initial changes in the pia mater, and, because they found these changes in parts of the pia with no lesions in the gray matter at the corresponding level, they deduce that the infection spreads inward from the pia. There were no cases in this epidemic showing exclusively affections of the meninges, so as to constitute a true meningitis, but in all, at some time or other, and usually early, there were symptoms of meningeal irritation and excess of fluid. Never was there spasticity of the extremities. Frequently rigidity of the neck was noted, enough to indicate gradations from a pial irritation to a meningomyelo-encephalitis. There were never any cocci or polynuclears found in the fluids, so that cerebro-spinal meningitis cannot be considered. Among twenty-six average typical cases, there were seven instances of early pronounced meningeal symptoms.

Great variation existed in the distribution of the paralysis: this is more marked of course in the typical cases which improved than in the fulminating cases. The legs as usual were affected most frequently, twenty-seven times in forty-five cases, seventeen times alone one or both, five times participating in a mixed palsy, and five times in a crossed paralysis. The arms were affected five times singly, twenty-two times as a double arm or crossed paralysis; once there was a simple crossed paralysis. Once the respiratory muscles were the only seat of paralysis, which seems to be the only case in which the bulb alone was effected.

Another class of cases deserves particular mention and special attention, because of their hygienic importance. I refer to the abortive or atypical cases. This nomenclature has been used before, and, while it may be open to objections, there are no other apposite single words. Such cases show the constitutional symptoms and physical signs but no palsy, or at most only a transient weakness. The symptoms consist of nervousness, irritability, slight fever, constipation, transient suppression of urine, headache, occasional pains in the shoulders or lower extremities, the atypical strawberry tongue, dilated pupils, photophobia and injected conjunctiva, but no alteration of the reflexes. In three of thirteen cases which I saw, more or less acutely ill, there were symptoms of stiffness of the neck and indefinite soreness on pressure over the cervical vertebrae. These all recovered without sequelae.

The prognosis of the typical cases is good for life and unfavorable as to the use of the affected muscles. It is moreover noteworthy that a few of the cases which are typical in course, and pronounced in the paralytic signs, clear up so well that no trace of the cord lesion remains. I do not have later reports from all the cases of which I have notes, but these attacks which clear up perfectly form but a very small percentage of the completely reported cases. These cannot be classified among the abortive cases because of the pronounced paralysis, in one case even accompanied by appreciable wasting. The outlook for the rapid fulminating type is very grave, four out of five cases seen by the writer proving fatal. The abortive cases, of course, rapidly clear up and leave no sequelae. Among 114 cases of all types, eighty of which were typical or fulminating, there were ten deaths or 9 per cent. Nine of these fatal cases were of the fulminating type or acute ascending paralysis affecting the respiratory center.

These clinical considerations contain little if anything new of the epidemic picture of acute anterior poliomyelitis; they do, however, characterize the form assumed by the disease and indicate the difference from the sporadic cases. The evidences of the disease varied considerably, and there were many combinations of the palsied parts. The disease carries with it the expression of an acute infection. In this outline, I have not attempted to be exhaustive in clinical study since this has been so well done by neurological observers. I have merely intended to draw the clinical picture and emphasize the prominent features, especially those to which I must refer further on.

Before taking up the next heading, a word might be said as to the infection atrium. It has been suggested that the intestinal tract is the infection atrium of this disease. So far as the probability of intestine toxemia or of auto-intoxication is concerned, I think it can readily be excluded if the extent of this epidemic be considered. Intestinal conditions in a child of four months and of fifteen years are essentially different. These, it might be mentioned in passing, are age limits of the typical cases encountered in my work. The intestinal tract, as the place of entrance for a specific organism, is naturally difficult to establish, especially because of the difference in age, such a difference carrying with it a priori, a difference in the possibility of exposure because of the difference in food. The absence of history of dietetic errors, except in five of thirty-five cases, makes the probability of dyspeptic disturbance having anything to do with the disease rather remote.

Attention was given to nose and throat conditions and the presence or history of eye and ear diseases. With reference to the latter it might be said that the eye was never acutely affected, In one case only was there ear disease, which had existed for a long while

before the onset of the paralysis. In twelve cases out of forty-five there were hypertrophic tonsils; in two others, acute pharyngitis and tonsilitis were present; in one, an acute coryza. In no case (of which I have complete notes) is there a history of pre-existing infectious disease within six months. I cannot substantiate the observation made several times that this disease is connected with the acute infections of childhood. In DuBois, there were no cases of infantile paralysis, but over a hundred cases of measles.

The infection atrium is, according to these observations, absolutely hidden. By exclusion only, the indication is toward the digestive tract. Personal experience in this epidemic leads me to believe that an acute general infection is present which later attacks the spinal and cerebral systems, because they are the seats of predilection of the virus. The pronounced acute constitutional symptoms, with their very uniform character, point directly to such an assumption. Harbitz and Scheel believe in the origin in the alimentary tract.

HYGIENIC CONSIDERATIONS.

This heading can well be divided into General (including distribution of cases in centers, municipal, sanitation, etc.) and Personal (comprising the factors surrounding the individual cases).

In considering the subject of General hygiene, the first thing to claim our attention is the distribution of the cases within the town. No better example for our use could be found than that of Oil City. This city of 16,000 population is divided into three parts by the Allegheny River and Oil Creek. The eastern and southern portions of the city are situated on the sides of hills where the natural drainage is perfect. The northwestern section is on the lowland by the river and creek beneath a hill, but not running up on it. This portion and the section bordering the Oil Creek on the west side of the stream and a portion of the east hill, north side, form the poorest section of the town. Here foreigners live under the most insanitary conditions. The southern and central portions of the east hill, the eastern portion of the south side of the town, represent the middle and upper middle classes whose sanitary conditions are good. The western section of the south hill is the best part of the town, both as to class of residents and sanitary condition. In the sections first described, fifteen cases of poliomyelitis, typical and atypical and cerebrospinal meningitis (fulminating attacks (?)) occurred during the late Summer and early Fall. In the middle class section of the town, thirty-six cases represent these diseases. The remaining six cases were among the very best families. These figures represent approximately the relation between the classes, numerically speaking, represented in Oil City. On the top of the south hill, the

climatic conditions are exceptionally good, and within a short radius six cases developed. The whole town receives the same water. There is no connection between the waterways, railroads or manufacturing plants to the houses chiefly affected. In considering the platted cases, as shown on the chart, it can be said that there is practically no relation so far as the dwelling is concerned. In one instance, there was a rapidly fatal case of so called cerebro-spinal meningitis and typical poliomyelitis in adjoining houses, but no trace of intimate relation between the families could be discovered aside from the ordinary intercourse of neighbors. They developed within a few days of one another, the poliomyelitis case first. Attention is particularly attracted to this town because of the ease with which the classes of people can be separated. The poor live in the most unhealthy section on the lowlands, but show relatively no more cases than the affluent class on the opposite side of the river. It is interesting to note six cases in the southern part of the south side; this is at the top of a long hill, perhaps three-fourths of a mile from the river, the very best topographical locality.

The town of Eau Claire is at the highest point in Butler county (1,400 feet), and is situated on the crest of a hill, the main street running along its ridge, a gentle slope on either side. The situation and surrounding country are nearly ideal. The cases were located irregularly through the borough, seven of them being in the southeast quadrant. If any comparison can be made between the divisions of this borough, this particular section is the second best.

The town of DuBois lies in rolling plateau land, and the eastern section of the town is divided from the business part by a marsh to the north of Sandy Lick Creek, perhaps three-fourths of a mile wide. The eastern section of the town, the best residential part, is located on a low hill with natural drainage into the swamp. There is a slowly running lake behind this hill. There were nineteen typical and two atypical cases in the borough and seven outside reported by the physicians. The main town is not divisible into sections representing classes, but these classes are about evenly represented in the cases developing in this section. There were three cases on the east side.

It has been suggested that dwellings on the lowlands are more often visited than those on higher localities. The foregoing facts actually controvert this suggestion. The writer does not mean that there seemed to be anything in the high localities which predisposes to the development of the disease, but merely that the cases could be so platted. One collection of cases, few in number, of which I have no accurate notes, occurred in a low lying village. It would seem from these facts that altitude, ground drainage and municipal locations have no relation to the development of this disease.

Water and milk can, I think, be easily excluded from the list of probable contagion carriers. Eau Claire was a favorable field in which to study these subjects. The water supply of this town is from drilled wells, fifty to eighty feet deep, cased through to the rock, some by iron and a few by cement. These wells are used only by the families owning them with the exception of a few. It happens that three of the families affected in this epidemic used wells owned by other people, among whom there were no cases. Moreover, these wells are used by other families having children who were not attacked. This water was drawn by bailers. The milk supply of Eau Claire came from individual cows belonging to families and from a dairyman who had three customers in town. Two of the five families affected took their milk from this farm. On examination of the milk after delivery, 140,000 bacteria were found, but no Bac. coli, no excess of leucocytes, and only a few streptococci. Inspection of this dairy and of private cows revealed them both to be good. One child of four years in this borough never used milk, and another four months old baby took only the mother's nursing. This water is ground water, that of Oil City is from artesian wells, while that of Dubois is surface water. There is, therefore, no relation between the source or kind of water and this disease. The sewerage systems of Oil City, Ridgway and Dubois have been inspected by this Department. They are not different from many other systems in the State, for which permission has been granted to make extensions.

The sanitary conditions of the towns could be described as good. The houses in the city are supplied with modern bathrooms in the majority of instances. In Eau Claire outhouses are used almost exclusively.

This entire region is drained by the Ohio River and its branches, so that the natural conditions are nearly the same as on any other extensive watershed, with one exception. Perhaps no other stream in this part of the country has been so polluted as the Allegheny river. The towns visited by this epidemic are near one of its tributaries, except Oil City, which is on the river.

Some one has observed that this disease spreads along lines of travel. New Castle on the west is a long distance from Oil City, Polk and Franklin counties intervening, the former with its institution for the feeble-minded having no cases, the latter only three. Ridgway and DuBois are but thirty miles apart and might be connected, but to connect Oil City with Ridgway, or even Eau Claire, is difficult. There is no railroad into Eau Claire, and the journey from Oil City to Ridgway takes one through Erie and Warren counties where there have been practically no cases: It is, therefore, probable that transmission did not spread along the railway. This means that the origin and course of the epidemic could not be followed along any

definite line of communication. The disease must still be classified in that group which we call "contagious" or requiring contact, and is, therefore, only transmitted any distance by traveling of people carrying the infective agent. I think it reasonable to assume that, if the disease were carried by travelers, it would not be limited to the section in which it prevailed. If the disease were carried by lines of travel, why should it have appeared in Oil City before it appeared in DuBois, which is very much nearer the original focus in the center of Elk county? We could of course suppose two foci. Much less did the water courses have to do with it because no infected town is down stream from another, nor is there any extensive water commerce in this region.

The transmission of this disease by the schools can, I think, be excluded. One fourth of the families which were studied closely had no children of school age, while among 114 cases only 11 occurred in children attending school. In Eau Claire this could be followed well; one child who had a typical attack sat in close proximity to five other children up to 24 hours before being taken sick; none of these five developed a single symptom.

Meteorology. By study of the reports of the Weather Bureau of the State of Pennsylvania, obtained by the courtesy of the office at Philadelphia, no unusual meteorological conditions could be discovered in the section affected by this epidemic during the months of June, July, August, September and October. The Spring had been quite rainy, the ground being damp most of the time.

Personal and Case Hygiene. This naturally falls into divisions which concern the environment of the case and the case itself. In investigating these cases, a set of questions was formulated to which rigid adherence was observed.

The personal and medical history of the case can be dismissed with the word negative. The manner of life has little, if any, influence upon the development of the disease; it has been thought that the disease is more common among the people who are careless of the children's food. The majority of parents are careless of the feeding of children. There was only one instance in twenty-eight families where unusual carelessness existed. I have no reports of cases among colored people, in the families of whom the hygienic surroundings are bad in the vast majority of instances. The manner of life could be described as good, in a few as excellent; naturally some very slovenly houses were seen. The number of children averages three in twenty-eight families studied. The observation was made by Dana of New York that animals were sometimes affected during epidemics. In the regions visited, any manner of animals was to be found, but in only two instances chickens were reported sick.

This was in DuBois. On one occasion I was able to get two of the sick chickens which I killed with ether. Observation of these birds revealed that they squatted and rose with difficulty, but there was no paralysis. The neck was not stiff and the bird could move it, but in lowering the head it seemed to use the wing and thorax muscles to force the neck down. Another family had sick chickens all the Summer and gave the following history: The chickens were noticed to be unable to run around as fast as the others, and later on became unable to run at all; when sitting, they would rise with difficulty and often topple to one side, which was always the same side in each case (?). They would hold their head and neck very erect and seemed unable to flex it to pick up food. They became quite weak and the householder, being unable to do anything for them, killed the sick birds as soon as found in order to protect the others. None of these were secured.

In beginning case hygiene, the incidence in the family will claim our attention first. Of the hundred and thirty-one cases of which I have reports, including typical and abortive attacks, one hundred and ten occured singly in the family. There were two cases in a family seven times, three in a family once and four cases in a family once. Of the seven instances of two cases in a family, three had two typical cases, three had one typical and one atypical, and one had two abortive cases. The instance of three cases in one family concerned two atypical and one typical; where the four cases occurred, typical and atypical were each represented by two. Of fatalities among these multiple cases, there were two, one where there were three cases in a house, and one where there were but two. The average number of children as mentioned above was three. The relation of boys affected to girls is about as five is to four. The average age was 3.3 years. Of twenty-eight families closely studied, seven had one child, three had two children and eighteen had three or more.

When cases developed in the same family, they usually appeared at the same time, or within two days of one another. When any interval elapsed between the cases, the secondary was usually abortive in type. This does not mean that cases which developed at or near the same time in one family were always typical for as in family "A" (cases 6-9 inclusive) a three year old boy developed a typical case 9-22, a sixteen months old boy developed an atypical attack 9-24, and the mother (thirty-one years) was taken 9-27 with an atypical case; to follow this, I might add the cases of two sisters, the first being a five year old girl who died on the fifth day of an ascending paralysis, while the seventeen months old child developed a mild typical attack seven days after the sister was taken sick and two days after her death. When last seen, the paresis, which had been

present three weeks altogether, was completely gone and a slight knee jerk could be obtained. The younger child had been allowed to play unrestrainedly with the sister until two days before the latter's death. There is no reason to believe that this child had been otherwise exposed to a case. The diet of both had been careful and identical in character.

Another case may be cited which was severe and fatal, followed in four or five days by two abortive attacks in brothers. There had been no restraint in communication with the other children or playmates. Among these latter no cases occurrred, for I was able to follow every visitor whom the child had seen. From the fact that the majority of multiple cases break out simultaneously in a family, it would seem that the infective material is contagious only at one time, acts suddenly and is gone, perhaps being transmissible at only one stage.

Another interpretation might be put on this secondary development of atypical attacks. It may be that the children were exposed or infected at the same time, but for some unknown reason one child reacted in a typical manner, while the other had resistance enough to attenuate the virus and react in an atypical manner. Although I have no proof for maintaining either of the hypotheses, one basis for this latter is found in the two sisters (one of whom died) who were kept under identical conditions, the family life being so arranged. It is very difficult to compute the effect of the typical cases, but it is almost impossible to measure the effect of the atypical cases because many of them are ambulatory.

The beginning of the outbreaks is absolutely obscure. Only four instances are at hand which may indicate an incubation period, two of which I have by the physicians' report. The first is the instance of the two sisters described above, in which seven days elapsed between the time the two children were noted to be sick and four days elapsed between the last time the second child played with her sister and the development of her illness. From what follows, the first stated period seems more like the incubation time, indicating in this case that the second child caught it from the fatal case during the beginning of the attack. Another instance, suggesting an incubation time, is one of which I have imperfect notes, but concerns a child who met a relative, when returning from a house where a case existed, at a railway station, the child being taken sick a week later with a typical attack. A third instance could be closely folllowed. A woman visited daily from 9-26 to 9-30 two families where cases existed, and on 10-10 her boy, fifteen months old, developed a very pronounced abortive attack. These facts suggest an incubation period of seven or ten days.

A case reported by a physician from a town distant from the section which we are now considering, where there were a few cases, concerns a girl who had a typical attack, this being followed in ten days by abortive attacks in twin brothers (nine months old). These are only instances in my work where any sort of trace to a previous case could be found.

In reviewing the foregoing facts, it is far from an easy matter to draw conclusions, or to generalize. Although it has been claimed that the alimentary tract is the infection atrium of this disease, careful case recording of thirty-five instances of illnesses, less than three weeks' duration, when the history giver's memory was freshest, fails to elicit history or symptoms definitely pointing to a condition which would lend support to this view. I have heard of six cases following the ingestion of bananas in moderate numbers, by two to four days, but in only one instance did the child show any dyspeptic symptoms after eating the fruit.

Insects deserve a word. Mosquitoes are not very plentiful in that section of the State. If one child of a family were bitten by an infected mosquito or other insect, why were there so many instances of single cases in a family, all of the children presumably exposed in the same degree? In these rural districts, many of the children are covered during sleep. Domestic flies are numerous this year, but not more so than at some previous seasons. Inspection of the swamp and lake at DuBois failed to discover any larvae of mosquitoes at the time I was there. No unusual insects were seen this year.

PATHOLOGICAL WORK.

In considering the best means of investigating the etiology of acute anterior poliomyelitis from a bacteriological standpoint, it was decided that the nose, throat, eyes and ear and spinal fluid should receive the most attention. Blood was not investigated because it has been done thoroughly before and the difficulty of working so far from the laboratory. The material was difficult to obtain, family objection being presented very often. Of six deaths, I was able to get but one post mortem. Of a score of cases under a week, older than this but showing signs of pressure, or slowness to recover from the constitutional symptoms and signs, only five lumbar punctures were permitted. These punctures were made at the usual interspace. The fluid was in all instances perfectly clear and limpid, and did not produce a coagulum on standing. The smears made at the bedside showed very few cells. They were almost altogether lymphocytic, there being practically no polymorphonuclears. The cells found in a single fluid were too few to count,

but by taking the several fluids together the mononuclear per centage seemed to be 60-70 per cent. These fluids were inoculated on blood agar, Loefflers blood serum and plain agar. Smears were also made from the nose and throat. Other points of pathologic change were examined when present.

Bacteriological work on the spinal fluid and other cultures is presented in detail below. It will be observed that in four spinal fluids a Gram positive diplo-or-tetracoccus was recovered when the fluid was poured into glucose bouillon and incubated. This Gram positive diplo-or-tetracoccus was found in all the cultures from the nose and throat. In 70 per cent. of these nose and throat cultures, a pneudo-diphtheria bacillus was found and in two cultures an organism, morphologically and biologically the true diphtheria bacillus was found, but which did not have virulence in guinea pigs. None of these cultures produced any pathologic manifestation in experimental animals which could be compared to poliomyelitis; indeed they seemed devoid of pathogenicity.

The spinal fluid of two of the cases was injected into the spinal canal of a monkey without result. The monkey's nose and throat were inoculated with the Gram positive coccus, likewise without result. Despite the constant occurrence of these pneudo-diphtheria organisms and diplococci, their lack of virulence seems to relieve them of responsibility. Perhaps we do not yet know how to handle them, or, as suggested above, they are attenuated. It is only advisable to mention their existence.

Because of the presence of diphtheria-like organisms, Dr. Dixon suggested the use of diphtheria antitoxin. It was injected into one case during the early acute constitutional manifestation, except the paralysis which did not develop after the injection. Naturally the effect of the antitoxin is problematic. To add to the probability that this case was truly a poliomyelitic infection, it may be mentioned that the boy played with some children ten days before, among whom one child died five days later of poliomyelitis.

The following is the detailed report of Dr. J. B. Rucker, Assistant Bacteriologist in the Laboratories, upon the cultures which I forwarded from the field:

Case 11. Mild atypical, male (fifteen months). Smears—nose and throat. Mononuclear and polymorphonuclear leucocytes, desquamated epithelium, gram positive diplococci, a few gram positive rods.
Cultures: Eye—Micrococcus aureus.
Nose—Gram positive diplococci and bacterium pseudodiphtheriticum.
Throat—Micrococcus pyogenes and bacterium pseudodiphtheriticum.

Case 12. Fulminating fatal, male (eleven years). Smears—fourth ventricle. A few nerve cells and lymphocytes. No bacteria or protozoa. Lon-

gitudinal fissure—lymphocytes and polymorphonuclear leucocytes. No bacteria or protozoa.

Cultures: Fourth ventricle—Gram positive diplococcus.
Longitudinal fissue—Gram positive diplococcus.
Nose and posterior pharynx-micrococcus aureus and bacterium of bacillus subtilis type.

Case 13. Severe atypical, female (seven years). Smears—nose,—Lymphocytes, epithelium, Gram positive diplococci, rods resembling Bacterium pseudo-diphtheriticum.

Throat—Lymphocytes, polymorphonuclear leucocytes and epithelial cells. Many diplococci and staphylococci.

Eye—Polymorphonuclear leucocytes.

Cultures: Nose, tonsil and naso-pharynx—Gram positive. diplococus and Bacterium pseudo-diphtheriticum.
Eye—micrococcus pyogenes.

Case 14. Severe atypical, male (four years). Smears—nose, tonsil.

Nose—mononuclear and polymorphonuclear leucocytes; Gram positive diplococci, medium length thick rods and diphtheroid forms.

Tonsil—mononuclear and polymorphonuclear leucocytes; Gram positive diplicocci, streptococci and diphtheroid forms. Bacillus maxims.

Cultures: Naso pharynx and nose—Gram positive diplococcus, Bacterium pseudo-diphtheriticum, micrococcus aureus and a baccillus of the subtilis type.

Case 15. Severe typical, female (two years) (8 c.c. fluid). No nose or throat smears made. Smears from spinal fluid—a few erythrocytes, mononuclear and polymorphonuclear leucocytes, with the mononuclears greatly in the majority. No bacteria or protozoa were found.

Cultures: Nose—Gram positive diplococcus, bacterium pseudo-diphtheriticum and bacillus mesentericus.
Spinal fluid—Gram positive diplococcus.

Case 19. Fulminating fatal, male (four years). (10+c.c. fluid).

Smears: Nose and spinal fluid.

Nose—Mononuclear and polymorphonuclear leucocytes; many Gram positive diplococci and dipththeroid forms.

Spinal fluid—mononuclear leucocytes in small numbers; a few erythrocytes and Gram positive diplococci.

Cultures: Spinal fluid—no growth.

Case 21. Severe typical, male (four years). (3 c.c. fluid) Smears—Nose, throat, spinal fluid.

Nose—epithelium, mono- and polymorphonuclear leucocytes. Gram positive diplococci and Gram negative rods.

Throat—epithelial cells, mono- and polymorphonuclear leucocytes, Gram positive diplococci, a few long rods, probably Bacillus maximus.

Spinal fluid—mononuclears, no organisms found.

Cultures: Nose and throat—Micrococcus aureus, Micrococcus pyogenes, a Gram positive diplococcus.

Case 26. Mild typical, male (two and a half years). Smears—nose.

Nose—large and small mononuclear and polymorphonuclear leucocytes, Gram positive diplococci and streptococci.

Cultures: Gram positive diplococcus, Bacterium pseudo-diphtheriticum, Micrococcus aureus and Cladothrix fungiformis.

Case 30. Severe typical, male (thirteen months). Smears—nose and throat.
Nose—diplococci and tetracocci, short pointed rods, epithelium and polymorphonuclear leucocytes.
Throat—epithelial cells, diplococci and streptococci.
Cultures: Nose, throat, eye.
Nose—Micrococcus pyogenes, Bacterium pseudo-diphtheriticum, Leptothrix gigantia, Cladothrix fungiformis.
Throat—Bacterium pseudo-diphtheriticum, Cladothrix fungiformis.
Eye—A gram positive diplococcus, Micrococcus pyogenes, Cladothrix fungiformis.

Case 31. Mild typical, female (three years). No smears from this case.
Nose—Bac. cereus and Bacillus mesentericus.
Ear—Bacterium pseudo-diphtheriticum, B. citreus, B. cereus.

Case 33. Mild atypical, female (nineteen months). Smears—nose.
Nose—epithelial cells, leucocytes, many diplococci, a few short thick rods.
Cultures: Child's nose, mother's nose, mother's throat.
Child's nose—Micrococcus pyogenes. Micrococcus aureus.
Mother's nose—Micrococcus aureus, Micrococcus pyogenes, bacterium pseudo-diphtheriticum, Gram positive diplococci.
Mother's throat—Micrococcus aureus, bacterium pseudo-diphtheriticum.

Case 34. Severe typical, fatal, male (fifteen months) (26 c.c. fluid). Smears: Spinal fluid—no bacteria mononuclears.

Case 35. Severe atypical, male (six years). Smears—nose, throat.
Nose—epithelium and Gram positive diplococci.
Throat—epithelium, polymorphonuclear leucocytes, Gram positive diplococci.
Cultures: Nose and throat.
Nose—Gram positive diplococci, Micrococcus pyogenes, Bacterium pseudo-diphtheriticum.
Throat—Bacterium pseudo-diphtheriticum, Micrococcus citreus.

These are the results from smears and cultures made at the bedside. When the tubes containing cultures and fluid were received in the Laboratory, some of the latter was immediately planted in 1 per cent. glucose neutral broth aerobically and anaerobically. Of the four spinal fluids examined, all showed the presence of a Gram positive diplococcus. The same organism was found in nine of the above thirteen cases upon the cultures sent to the Laboratory from the patients' bedside, and twice it was found only in the smears made at the same time. A description of this coccus follows, and pertains to the organisms isolated from the nose and throat, on cultures from the patient, and from the spinal fluid in the Laboratory. From the cultures of the spinal fluid made at the bedside, only one (case 15) showed the presence of this Gram positive diplococcus. The culture from the fourth ventricle of case 12 also contained this coccus.

The Gram positive diplococcus found in all but one of the cases may be described as follows:

Morphology; biscuit shape diplococci and tetracocci, some times in chains of three or four pairs, with flat sides apposed, non-motile, Gram positive.

Gelatin plates.

Macroscopically: convex, circular, homogeneous, mucilaginous, entire, translucent, iridescent, gray; center, yellowish gray.

Miscroscopically: circular, granular, entire, translucent, brown.

Agar slant: luxuriant moist, mucilaginous, homogeneous, entire, gray.

Glycerine agar: same as agar.

Blood agar: same as agar except as to color, which is yellowish brown.

Blood serum: confluent white to cream in color, no liquefaction.

Gelatin: white granular growth along stab, no liquefaction.

Potato: moist, white growth, no change in color of potato.

Bouillon: turbid, white stringy sediment, no surface growth.

Milk: acidified. No coagulation; acid but no gas in glucose bouillon, no indol produced, nitrates reduced to nitrites.

Pathogenicity: 3 c.c. of the spinal fluid from cases 16, 19, 21 and 34 were injected into the peritoneal cavity of guinea pigs with no effect whatever, and even 3 c.c. of the glucose bouillon cultures, twenty-four hours old, of the Gram positive diplococcus from the spinal fluid of these cases, when injected into the peritoneal cavity, yielded no results.

A white mouse was inoculated subcutaneously at the root of the tail with 1 c.c. of a twenty-four hour bouillon culture of the Gram positive diplococcus. There was no reason for believing that this diplococcus was pathogenic even to mice.

Two loopfuls of what appeared morphologically and culturally to be the true diphtheria Bacillus, when introduced into a pocket of skin of a guinea pig, failed to show any pathogenicity.

The post mortem examination on the two hens sent to the Laboratory showed two very thin bony chickens; gills ears, nostrils, and whole head under feathers were yellow, as is found in chicken cholera. An organism practically identical with cholera Bacillus in chickens was found in the blood and throats of these birds. Hen cholera was evidently the cause of death. No lesions similar to those of poliomyelitis were found in their cords.

Upon returning to the Laboratory, the experiments and tests just described in Dr. Rucker's outline were repeated and found uniform. The discovery of the Gram negative diplococcus in four spinal

NOTE.—So far as we are able to discover, this corresponds with the coccus found by Geirsvold and by Harbitz and Scheel during the epidemics in Norway and Sweden.

fluids, and its frequent recovery from the nose, led us to hope that we had an organism of some importance. As was mentioned in the outline, the meagre description given by the Scandanavian workers seems to fit our coccus exactly. As has been shown, we were disappointed in its toxicity toward small laboratory animals. We, therefore, decided to try its virulence upon a monkey, of which the following is the history:

On October 29th, 2.5 c.c. of spinal fluid from case 34 was injected into the spinal canal of a cebus monkey. No result came of this, so that on November 4th 3.5 c.c. of the same fluid was again injected into his spinal canal; this time with no result, not even a rise in temperature. On November 25th, two loopfuls of the culture of the Gram positive diplococcus were introduced into each naris of the monkey with no effect. On December 6th, at 4 p. m., the monkey was inoculated with two thirds of the surface growth of a twenty-four hour agar culture, from the spinal fluid from case 34, into the spinal canal. On the morning of December 7th he was unable to use his hind legs in walking; when sitting up, he tended to fall backward unless he very carefully balanced himself. When lying down, he seemed to lie by preference on his right side. He showed on examination a spastic palsy of the legs and tail. The knee jerk was very greatly accentuated. No affection of the upper extremities could be observed. The monkey took a banana which was handed him and ate it greedily. His temperature rose to 102 deg. F. on the night of the injection, was the same on the following morning; it was 102 4-5 deg. F. that evening, which was its highest point, and after this it rapidly declined, reaching normal at midnight, after which it ran the average daily course seen before the injection. The palsy disappeared two days later, after which the animal regained perfect health. On the third day the spinal canal was tapped. One c.c. was obtained. This fluid contained a very high percentage of polynuclears, with few mononuclears. None of the former contained the cocci. Cocci were seen in the stain and obtained in pure culture by incubation on bouillon. The animal showed no symptoms of poliomyelitis during his illness, which was like a meningitis. Meningitis was found at the animal's death on December 20th, 1907. It is not necessary to include all the autopsy notes, but it will suffice to state a violent hemorrhagic meningitis, bearing no resemblance to poliomyelitis, was present. Microscopical sections show a violent polynuclear infiltration with congestion involving the meninges of cord and brain and the superficial layers of the cortex. There was no excess of fluid, but that present was turbid. The same Gram positive diplococci were recovered.

Pathological sections of the cords of guinea pigs also failed to show any analogy to this disease. Because of the nervous manifestations of the chickens, their cords were also sectioned. They were found quite normal. The birds had nothing to do with the disease now being considered, that is evident.

The result of the pathological work has been disappointing. Our hopes lay in a careful examination of the spinal fluid, its character and its sediment, but they were completely blasted. The paucity of cells has, of course, no diagnostic significance, but it does not seem too much to say that an excess of fluid with very few cells would be helpful in differentiating a case of epidemic poliomyelitis with meningeal irritation from cerebro spinal meningitis.

If this work does nothing more than present clearly the type assumed by infantile palsy in the epidemic form as contrasted with the sporadic, it will help perhaps some subsequent work; first, perhaps in classification, and later in etiology. Perhaps the disease is contagious, but the simple rule of contact will not explain its communication.

From this report the following conclusions seem justifiable:

1st. That acute anterior poliomyelitis was epidemic in the northwestern part of Pennsylvania during the late summer and fall of 1907.

2nd. That the epidemic form of acute anterior poliomyelitis differs from the sporadic form.

3rd. That there are many stages of severity in epidemic poliomyelitis, varying from the abortive type to a rapid form like Landry's paralysis, combined with symptoms and signs of meningeal irritation.

4th. That in most cases, at least of typical poliomyelitis, there is some evidence of meningeal irritation and excess of fluid.

5th. That the disease seems to be an infectious one, because of the widespread appearance in localities certainly not exposed to conditions which we have reason to think would bring about the same form of intoxication.

6th. That personal and medical history have no bearing on the occurrence of the disease.

7th. That simple contact will not as yet explain the transmission and failure of transmission.

8th. That fomites and insects do not seem to transmit the disease.

9th. That water, milk, etc., do not transmit the disease.

10th. That municipal and personal hygiene have little or nothing to do with the causation of the disease.

11th. That geographical conditions seem to have no influence either in the origin or the spreading of the disease.

12th. That the contagion seems to strike a house, exert its influence at once and then leave or lose virulence; probably also a case is infective only at a certain stage.

13th. That the incubation period is probably seven to ten days.

14th. That the bacterial infection may find its infection atrium in the alimentary tract, this being arrived at by exclusion. Although a bacterium has been found in the nose and in the spinal fluid of these cases, there is no justification at present to connect it with the etiology of the disease.

15th. That non-virulent diphtheria organisms and Gram positive diplo-ortetracocci are present in a very large percentage of noses and throats of acute cases.

16th. From the reasons already given the hygiene of anterior poliomyelitis in the epidemic form deserves serious consideration from health authorities.

EPIDEMIC OF TYPHOID FEVER AT RIDGWAY, ELK COUNTY.

Typhoid fever having become unusually prevalent in the town of Ridgway, Elk county, early in the month of August, Dr. A. B. Moulton, first assistant in the Division of Medical Inspection, was deputed to investigate the causes of the outbreak and aid the local authorities in its suppression. He was shortly followed by Chief Engineer Snow and one of his assistants who made a careful inspection of the various sources of water supply.

Ridgway, the county seat of Elk county, located in the valley of the Clarion River, at the point where it is joined by Elk Creek, is a prosperous business centre of about 6,700 population, on the main line of the Philadelphia & Erie Division of the Pennsylvania Railroad, as well as the Buffalo, Rochester & Pittsburg Railroad.

The town is situated on both sides of the river and creek and is divided by these streams in three wards. Ward One comprises that portion of the Borough south of the creek and east of the river. Ward Two comprises that portion of the town west of the river, while in Ward Three is included all that portion of the town east of the river and north of the creek. The larger portion of the manufacturing district is included in Ward Three, as well as that residential portion of the city called Hyde's Hill. The First Ward includes by far the greater part of the residential portion of the town.

The water for domestic purposes is secured from three different sources—the general municipal supply, a quasi-public supply from a county spring, so called, and from numerous springs and wells throughout the town. The municipal supply proper comprises that secured from Gallagher Run, which has a water-shed of about $1\frac{3}{4}$ square miles, almost uninhabited. This supply is sufficient for do-

mestic purposes only during about six month of the year, and is supplemented by water secured from two drilled wells, cased with 8 inch pipes, whose depths are variously stated to be from 52 feet to 93 feet. The general report being that the last 25 feet of these wells was bored in the solid rock.

Since, as we have previously stated, Gallagher Run is frequently dry, as was the case at the time of our visit, water was pumped from these wells direct into the mains—any surplus overflow being stored in a circular concrete reservoir 70 feet in diameter by 12 feet in depth, located just below the dam in Gallagher Run. From this Reservoir the water is delivered by gravity into the town.

The county or Early's spring, so called, is an out-cropping on the hillside in the southwestern part of town, and furnishes an abundant amount of water, and owing to the fact that the city water is hard and contains iron, and furthermore, because of the fact that this spring was dedicated to the county and a provision was made whereby those who desired to have pipes connected with it were freed from a water-tax, it has been piped into many homes. This spring also furnishes water to the jail, court-house, and a public fountain in the Square.

The springs and wells which constitute the third source of supply are numerous and scattered very generally about town, some of them being located high up on the hillside above any house, while others are situated in the lowlands. Among the springs in general use may be mentioned the Hyde Spring, Powell Spring, Hospital, Sheehan Spring and Railroad Spring. Some few of the springs are so located that pollution would be improbable, but the city wells are located on the flat, as well as the County Spring, and many other wells and small springs about town, which are in constant use, are very liable to contamination. Table No. 8 shows the result of the bacteriological examination of both the public and private water supplies.

The milk used in Ridgway is secured from dealers, who obtain their supply from dairy farms in the vicinity of Ridgway, as well as from numerous dairies at widely scattered points throughout the northwestern portion of Pennsylvania and even through the southwestern portion of New York State. This supply is supplemented by a large number of private sources. A common pasture is provided where those having a single cow may find pasturage, and the people are encouraged to produce their own milk, those having a cow often selling the milk to their relatives or friends.

The method of sewage disposal in this town is not what one might expect in a town in which is represented so much wealth as there is in Ridgway. Human waste is disposed of through privies and public

sewers, as well as outside closets with dirt vaults. It is said that about half the streets are piped with private sewers, some of which empty into the rural runways, which finally empty into the river, and since many of the private sewers existed prior to a limited municipal sewerage system, the people have been very loath to make connections therewith. In many sections of the town, even in localities where one would least expect them, the outside closet with dirt vault exists.

The soil is porous and a few feet below the surface broken rock and hard pan are encountered, and since the town is built on rising ground with steep slopes, many of the houses are above the springs. Under these conditions the contents of earth vaults or open surface sewers could quickly saturate the ground with pollution, which would naturally be carried by the first heavy rainfall, either on the surface or by underground channels to the springs.

At the time of our arrival an open sewer emptied into a basin within twenty yards of the city wells above mentioned, and from this basin it drained by an open ditch to the river.

In 1904 this town was visited by Typhoid Fever and as a result of the investigation made by an inspector from the State Board of Health the following recommendations were made:

> 1. That the city wells be abandoned. The location is such that I would not recommend drilling the wells deeper. The spot on which the pumping station is located has been the dumping ground of the city for years. A better location would be higher up. Perhaps near the city reservoir. A person understanding sanitary conditions should locate the well.
>
> 2. That the county spring be abandoned as far as being used for drinking purposes.
>
> 3. That the Zion Hill Spring, under Ruse Street, be filled up at once.
>
> 4. The sewer from the hospital and the one emptying near it be extended to the river.

On these recommendations the County Spring and City Wells were condemned and recommendations relative to a safe supply were made.

From the time of the former epidemic to the present, Typhoid has been endemic. In spite of the lesson so forcibly illustrated and the advice of the State Board of Health, no action seems to have been taken and when the present epidemic made its appearance the wells and County Spring were the main sources from which water for drinking purposes was secured, a large public fountain in the Square being supplied from the County Spring. This was largely patronized owing to the good taste of the water and its clear sparkling appearance.

At the time of our arrival in Ridgway some 80 people were said to be suffering from Typhoid Fever. These cases were very widely distributed among the various classes of people so that a water-borne infection was suspected. A careful census of the cases showed that this suspicion was well founded, and moreover it pointed very conclusively to the source from which the infected supply was obtained, as is very clearly shown in Table No. 1. Reference to this table will show that in over 90 per cent. of the cases developed it can be conclusively proven that water from the County Spring was either habitually or occasionally used for drinking, either in the home, at the place of work or at the public fountain, and in this connection we disregard the possibility of the individual milk supply being contaminated by the use of this water for the washing of private milk utensils. A careful investigation of the County Spring and its surroundings was consequently made. This spring, as we have previously stated, is situated on the hillside in the southeastern portion of the town, the bank having been dug away, the spring has been walled up and a house built over it. The pool is approximately some 20 feet wide and 25 feet long.

Above this spring are a number of houses with outside dirt closets, and with hoppers at the back-door into which they throw all forms of household slop and chamber-lye. This is carried by a 4 inch sewer pipe down the hill past the spring. The joint of this pipe was dug up and it was found that the sections of pipe were not cemented together, and the earth about was discolored from the oozing of the waste material.

Immediately above the spring, some 300 feet is a double house with an earth closet some 40 or 50 feet back, and in the upper side of this house a case of Typhoid Fever occurred during June. This patient was in Pittsburg during the month of May and returned on the last day of the month. He worked until the 6th of June although he felt unwell and on the 6th he called upon a local physician who sent him home. At this time he had a diarrhoea and was in the habit of visiting the closet in the rear of the house, up to June 10th, at which time another physician was called and the diagnosis of Typhoid Fever was made. The positive diagnosis was made on the 12th. This patient was ill in bed for six weeks. An examination of a specimen of blood taken from this patient gave a positive Widal re-action.

When this closet was cleaned out by order of the Department of Health, a small spring was found to be present in the vault, although there was no evidence of overflow. As we have previously stated the soil is very porous and underlain by broken or loose stone, and it is reported by reliable parties that when wells were drilled on this

hillside the water in the County Spring became roily, and it is further stated that when a certain garden some ways from the Spring was plowed the water became roily.

The character of the soil, the testimony relative to the Spring being influenced by local conditions of the soil, together with the existence of the improperly laid sewer pipe, and a privy vault with a spring in it, which must have discharged somewhere, and the presence of a Typhoid Fever patient on the hillside, which used the privy prior to the outbreak of this disease, forms a very conclusive chain of incriminating evidence against this water supply.

In addition to this circumstantial evidence, samples of water from the Spring submitted to the Laboratory, showed the presence of Bacillus coli, as is shown in Table No. 8.

This spring was promptly condemned as a source of water supply for domestic purposes, and a large quantity of freshly burned, unslaked lime was deposited in the Spring.

Placards warning the people to boil all water intended for domestic purposes were posted about town, and the Department circular setting forth the precautions to be observed by nurses and others having the care of cases of Typhoid Fever were published in the local papers.

The department stores, hotels and restaurants were instructed to serve to their patrons only such water as had been boiled for at least 30 minutes. Lime was provided in generous quantities, both for use in disinfecting discharges and to be deposited in privies and in open sewers.

A system of district nursing was instituted, not because of the poverty of those afflicted with the disease but because of the fact that nurses could not be secured for private work and there were too many cases for the families to care for their own sick.

Emergency hospitals were established—one in a private dwelling, the other in the Elk lodge rooms. These were for the care of those who could not receive proper care at home or could not be received in the County Hospital. The Doctors were requested to report not only such cases as had been conclusively diagnosed as Typhoid Fever but also those who were thought to have the disease. A copy of this list was given to the Health Officer who made a house-to-house canvass of the place, placarding the premises and determining the needs of the household, as well as learning whether it was necessary, or desirable that a district nurse should call. In nearly all instances where private nurses had not already been installed the people seemed anxious that the district nurse should pay them a visit and instruct them in the proper precautions to be observed, in order to prevent other members of the family from becoming infected. When-

ever during such visits the nurse found that a case could not be given the attention needed at home, the physician in attendance was consulted as to the advisability of moving the patient to one of the emergency hospitals.

Since not all of those sent to the emergency hospitals were in indigent circumstances a committee of two prominent citizens was appointed to determine whether those admitted should be treated free of charge or should make some payment, according to their means, for the attention given them, but none of those needing help were turned away. Distilled water for the use of the hospital was supplied by the Laboratory of the Elk Tanning Company.

When a patient recovered, was removed or died in any house, the physician in attendance notified the Board of Health on a card and the room occupied by the patient was disinfected by the Formaldehyde-Potassium Permanganate method.

The nurse in charge of the district work has reported that the people were, in all instances, very anxious to carry out the instructions given, and in so far as it was possible did everything in their power to prevent other members of the family from becoming infected.

The money for meeting the expenses incident to the epidemic was rasied by appropriation of Council and gifts through the Emergency Committee, and I must say that the donations were liberal and were confined to no one class of individuals. The Ladies' Aid and Auxiliary provided the bed and body clothing which were needed, both at the hospital and in the private homes. The citizens of the town responded quickly and generously to all requests for supplies, money or time.

The nurses employed by the Emergency Committee were untiring in their efforts and rendered most valuable aid to the physicians in their efforts to stamp out the disease. These faithful public servants are certainly entitled to a large share of the credit for the small mortality accompanying this outbreak. Out of 320 cases there were only 15 deaths. This is less than half the usual mortality and is a fresh testimonial to the value of the system of district nursing during an epidemic of Typhoid Fever.

TABLE NO. 1.

SOURCE OF WATER USED BY PATIENTS.

Of the 270 cases of which a census was taken—
130 drank from the County Spring constantly.
63 drank from the County Spring occasionally.
77 were uncertain.

TABLE NO. 2.

DISTRIBUTION OF CASES AS TO FAMILIES.

Number of Families Afflicted 200.

No. of families in which were 1 case,	156
No. of families in which were 2 cases,	29
No. of families in which were 3 cases,	8
No. of families in which were 4 cases,	5
No. of families in which were 5 cases,	1
No. of families in which were 7 cases,	1

TABLE NO. 3.

DISTRIBUTION OF CASES AS TO SEX, AGE AND CIVIL CONDITIONS.

SEX:		
Male,	156	
Female,	109	
Not given,	5	
Total,		270
AGES:		
1-10,	16	
10-20,	98	
20-30,	82	
30-40,	27	
40-50,	21	
50-60,	8	
60-70,	6	
Not given,	12	
Total,		270
CIVIL CONDITIONS:		
Widower,	3	
Married,	62	
Single,	50	
Total,		270

TABLE NO. 4.

OCCUPATIONS OF PATIENTS.

Blacksmiths,	2
Book-keepers,	4
Carpenters,	8
Civil engineer,	3
Clerks,	19
Domestics,	15
Draughtsman,	2
Housewife,	30
Laborers,	13
Masons,	6
Molders,	7

TABLE NO. 4—Continued.

OCCUPATIONS OF PATIENTS.

Mail carriers,	1
Machinists,	7
Milliner,	1
Painters,	3
Plumbers,	4
Printers,	1
Photographers,	1
Pupil-nurse,	1
Railroaders,	7
School children,	53
Teacher,	1
Telephone operators,	3
Undertakers,	1

TABLE NO. 5.

DISTRIBUTION OF CASES AS TO DATE OF ONSET.

August.		September.	
1st,	1	1st,	8
3rd,	1	2nd,	8
6th,	1	3rd,	3
7th,	1	4th,	5
11th,	4	5th,	2
12th,	4	6th,	1
13th,	7	7th,	3
14th,	4	8th,	1
15th,	7	10th,	1
16th,	4	11th,	2
17th,	9	12th,	1
18th,	21	13th,	3
19th,	10	14th,	2
20th,	46	16th,	1
21st,	2	17th,	2
22nd,	3	23rd,	3
23rd,	5	24th,	1
24th,	5	27th,	3
25th,	4	28th,	2
26th,	7	30th,	1
27th,	8	October.	
28th,	17	1st,	2
29th,	8	2nd,	2
30th,	10	4th,	3
31st,	3	7th,	1
		8th,	1

TABLE NO. 6.

EXPENSES CAUSED BY THE EPIDEMIC.

Nurses' fees,	$2,378 00
Board,	1,004 75
Railroad,	276 17
Laundry,	225 87
Hired help,	312 66

TABLE NO. 7.

Total No. of Cases, 320. Deaths, 15.

CASES TREATED AT EMERGENCY HOSPITAL.

Total No.	Complications.	Deaths.
61	9	4

Complications Classified.

Hemorrhages,	5
Typhoid pneumonia,	2
Phlebitis,	2

CASES TREATED AT ELK COUNTY HOSPITAL.

Total No.	Complications.	Deaths,
53	9	5

Complications Classified.

Hemorrhages,	3
Hypostatic conjestion of lung,	1
Perforation,	2
Pneumonia,	2
Phlebitis,	1

TABLE NO. 8.

Reports of samples of water from Ridgway examined at Department of Health Laboratories:—

		Bact. per c.c.	B. Coli per c.c.
8-20.			
No. 1.	County Spring,	12	0
No. 2.	City water from well,	7	0
No. 3.	Hospital spring,	2	0
No. 4.	County Spring, (?)	10	0
No. 5.	Mill Creek water,	700	0
No. 6.	Caught from pipe running from tank,	15	0
8-21.			
No. 1.	City well pump,	12	0
No. 2.	Snow plow works,	60	0
No. 3.	R. R. Spring,	200	0
No. 4.	Hyde Spring,	350	0
No. 5.	County Spring,	280	0
No. 6.	General Supply,	40	0
9-3.			
No. 1.	County Spring,	5,000	66
No. 2.	Shehan Spring,	5	0
No. 3.		500	0
No. 4.	City pumps,	180	4
No. 5.	Snow plow,	3,000	32
No. 6.	Dynamo works,	560	0
9-3.			
No. 1.		70	0
No. 2.		600	10
No. 3.		5,400	26
No. 4.		5,500	32
No. 5.		840	32

TABLE 8.—Continued.

		Bact. per c.c.	B. Coli per c.c.
9-10.			
No. 1.	Drilled well, No. 329 South St.,	45	0
No. 2.	Dug well, N. W. Corner South & East Sts.,	700	0
No. 3.	Dug well, S. W. Corner Centre & East Sts.,	130	0
No. 4.	Powell spring, No. 324 South St.,	45	..
No. 5.	Johnson spring, S. W. Cor. Metoxet & Stockholm,	410	0
No. 6.	Spring (Shultz), from faucet on N. side of Metoxet, E. of Jackson,	500	6
No. 7.	Drilled well, No. 40 South St.,	23	0
No. 8.	Drilled well, No. 122 Elk St.,	14	0
No. 9.	Drilled well, No. 237 High St.,	65	0
No. 10.	Dug well, No. 231 High St.,	10,000	0
No. 11.	Drilled well, No. 409 2nd Ave.,	62	0
No. 12.	Drilled well, No. 101 Cardott St.,	280	0
9-12.			
No. 13.	S. Borough well,	3	0
No. 14.	Early spring (near bottom 1½ water m. sp.),	6,000	0
No. 15.	Dug well (or spring) rear of No. 610 Race St.,	220	0
No. 16.	Spring, No. 610 Race St.,	11,000	250
No. 17.	Spring, E. end of Race St.,	110	0
No. 18.	Dug well, E. 12 Main opposite Hyde barn,	360	0
No. 19.	Dug well, No. 122 Grant St.,	4,200	40
9-13.			
No. 20.	Drilled well, No. 122 Sherman St.,	10	0
No. 21.	Spring, No. 142 Sherman St.,	28,000	180
No. 22.	Spring, E. end Allenhurst Ave.,	3,000	35
No. 23.	Driven well, S. E. Cor. 2nd & Chestnut Sts.,	350	0
No. 24.	Dug well, No. 415 W. 2nd St.,	430	0
No. 25.	Drilled well, No. 506 W. 3rd St.,	210	0
No. 26.	Driven well, No. 423 W. 1st St.,	6	0
No. 27.	Dug well, No. 418 W. 1st St.,	10	0
No. 28.	Dug well, No. 402 1st St. (N. W. Cor. Cherry),	210	0
9-14.			
No. 29.	Garretts spring, N. side of 1st, E. of Maple,	16	0
No. 30.	Grant's spring, near W. Boro. line, N. of W. Ridgway,	48	0
No. 31.	Drilled well, No. 502 W. 3rd St.,	3	0
No. 32.	Drilled well, No. 314 W. 3rd St.,	150	0
No. 33.	Drilled well, No. 519 Chestnut St.,	52	0
No. 34.	Drilled well, No. 414 Chestnut St.,	13	0
No. 35.	Driven well, No. 315 2nd St.,	120	0
No. 36.	Driven well, No. 313 Cherry St.,	28	1
No. 37.	Driven well, S. W. Cor. 1st & Cherry,	290	0
No. 38.	Driven well, No. 432 W. Main St.,	140	0
No. 39.	Driven well, No. 318 W. Main,	98	0
No. 40.	Driven well, No. 310 W. Main,	85	0
No. 41.	Drilled well, No. 239 W. Main,	260	0
No. 42.	Drilled well, No. 253 W. Main,	4,200	0
No. 43.	Driven well, No. 259 W. Main,	8	0
No. 44.	Driven well, No. 263 W. Main,	10	0
No. 45.	Driven well, No. 144 W. Main,	200	0
No. 46.	Driven well, No. 120 W. Main St.,	290	0

9-17.

No. 47.	Dug well, No. 122 Montmorency Ave.,	2,400	0
No. 48.	Drilled well, No. 206 Montmorency Ave.,	210	0
No. 49.	Drilled well, No. 214 Montmorency Ave.,	16,000	0
No. 50.	Driven well, No. 314 3rd St.,	58	0
No. 51.	Driven well, No. 314 1st	22,000	0
No. 52.	Driven well, N. W. Cor. 1st & Chest. Sts.,	60	0
No. 53.	Driven well, Standard Axe & Tool Works,	45	0
No. 54.	Spring, No. 638 W. Main St.,	230	2
No. 55.	Driven well, No. 308 Chestnut St.,	38	0
No. 56.	Driven well, Chestnut, opp. 1st,	40	0
No. 57.	Driven well, No. 206 Chestnut St.,	22,000	1
No. 58.	Spring, above N. end of Cherry St.,	780	0
No. 59.	Drilled well, No. 229 2nd St.,	800	2
No. 60.	Driven well, No. 229 2nd St.,	110	0
No. 61.	Dug well, No. 132 W. Main St.,	220	0
No. 62.	S. Boro drilled well,	96	1

REPORT ON THE DANGER OF FIRE IN FORMALDEHYDE DISINFECTION.

By CHARLES H. LaWALL, Ph. G., Consulting Chemist to the Commissioner.

The increased efficiency of formaldehyde disinfection as applied at the present time by means of the formalin-permanganate method of evolving the gas has brought with it a new danger, uncertain, yet none the less real, in consequence of the fact that upon several occasions at least the mixture has been known to take fire spontaneously.

During the winter of 1906-1907, Dr. Courtland Y. White, of Philadelphia, in connection with some disinfection work which he was doing for the Department of Health of the State of Pennsylvania, observed upon three occasions that the mixture caught fire after the combination of the constituents had begun and the room had been closed. It was fortunate that the fact was discovered on one of these occasions, as the flame was so high as to endanger neighboring articles in the room. Suspecting the possibility of impure ingredients, he wrote to Health Commissioner Dixon concerning the matter, who referred it to the writer for consideration and investigation.

It is well known that there is considerable uncertainty connected with reactions in which potassium permanganate plays a part, and that even with inorganic substance, as in the Kjeldahl method for the estimation of nitrogen, there is sometimes a spark or flash of fire when the permanganate is added to the other constituents. In the

formalin-permanganate method it has been customary to use two parts of formalin to one part of permanganate, adding the latter to the former and quickly leaving the room before the violent evolution of gas which shortly takes place has time to affect the operator. Working with quantities in some cases as high as one pound of permanganate, the amount of heat developed must be very great, and if there are any uncertain factors present, such as organic matter in the container which has been imperfectly cleaned, the danger of possible ignition is that much greater.

The flame which appeared upon the occasion described by Dr. White was a pale blue flame, reaching several feet into the air from the generating container. This agrees with the appearance of the flame of formaldehyde gas, which burns freely when ignited, even if mixed with a fair proportion of steam, as is usually the case.

The gas may be ignited from a 40 per cent. solution of formaldehyde by simply heating it and applying a match to the surface after ebullition has begun, and when the formalin-permanganate disinfection proportions are used in as small a quantity as one ounce of formalin and one half ounce of permanganate, using a beaker for a generator, the flame of the ignited gas has been observed to have a length of more than one foot.

In view, therefore of the uncertainty regarding the cause of the ignition of the vapor in these observed cases and in recognition of the hitherto overlooked fact that formeldehyde vapor is very inflammable, it would be well to practise this method of disinfection with the precautionary measures of using small quantities of the ingredients (not over one quarter or one half pound of permanganate to a charge) in several containers, surrounding these containers with larger ones containing water, being careful to extinguish all gas jets, pilot lights, fire, and other possible causes of ignition, and keep the generators away from the sides of the room where a flame might be communicated to inflammable material. It is not believed by the writer that this method of disinfection need necessarily be abandoned, but it is essential that its limitations and dangers be not overlooked in its future use.

THE DIVISION OF SANITARY ENGINEERING.

F. HERBERT SNOW, C. E., Chief Engineer.

THE DIVISION OF SANITARY ENGINEERING.

CONTENTS.

I. ORGANIZATION AND ADMINISTRATION.
- Office and and Office Force.
- Assistant Engineers.
- Field Officers.
- Local Health Officers.

II. OFFICE WORK.
- Corporation Reports.
- Recorded Plans.
- Petitions and Complaints.
- Orders of Abatement.
- Drafting.

III. ENGINEERING.
- Water Works.
- Sewerage.
- Designs and Construction.
- Special Work.
  - (a) Mt. Gretna.
  - (b) Railroad Water Supply.
  - (c) Miscellaneous.

IV. FIELD INSPECTION.
- Improvement of Water Sheds.
- General Sanitation.
- Water Sample Collection.

V. EPIDEMICS.
- Typhoid Fever Outbreaks.
  - Scranton.
  - Huntingdon.
  - Kittanning.
  - Spangler.
  - Manheim.
  - East Conemaugh and Franklin.
  - Ridgway.
  - Burnham.
- Anthrax Outbreaks.
  - Corry and Spring Creek.

VI. REFERENCES TO SPECIAL COUNSEL.

VII. CONCLUSIONS.

DIVISION OF ENGINEERING.

The following is a detailed statement of the operations of the Engineering Division of the State Department of Health to the end of the year 1907, being the second annual report made since the creation of the new Department of Health under Act No. 281, approved April 27th, 1905.

I. ORGANIZATION AND ADMINISTRATION.

Office and Office Force.

F. Herbert Snow, C. E., has continued throughout the year to discharge the duties of his position as Chief of the Engineering Division of the Department.

The offices of the Division are on the ground floor front, north corridor of the Capitol, and are those occupied by the Division during the latter half of the preceding year. Besides these rooms additional space has been assigned to the Division and used, comprising four rooms on the fifth floor of the building:

Six sub-divisions of the organization have been created in the administration of the work put upon the office, namely: That of general office work, that pertaining to water works and sewerage applications, that relating to special investigations, that relating to designs and construction, that of map-making and finally that of sanitary regulation.

There have been employed in the office eight stenographers and three clerks.

Assistant Engineers.

Walter S. Hanna, C. E., has been the principal assistant engineer in direct charge of the general office work. He received his appointment in March.

Mr. Frederick W. Witherell, principal assistant engineer in charge of investigations of water works and sewerage applications, resigned in March to accept a position with the American Water Works and Guarantee Company of Pittsburg.

Mr. F. H. Shaw was appointed and assumed Mr. Witherell's duties in May. In November Mr. Shaw resigned in order to devote his time to private practice, more particularly as engineer to the Sewerage Commission of the city of Lancaster.

Mr. William H. Ennis, who was appointed in August, served a short time as assistant engineer on water works and sewerage investigations. He was then transferred to construction work at Mont Alto.

Mr. Charles H. Cummings has been the principal assistant in charge of special investigations. Mr. Ralph E. Irwin, a graduate bacteriologist, was employed in this kind of work during the summer months and so also was Mr. John A. Schaeffer, a graduate chemist.

Thomas Fleming, Jr., C. E., assumed the duties of his position as principal assistant engineer in charge of designs and construction in September. The preliminary surveys and topography for the State Sanatorium lay-out at Mont Alto had been made previously by a special field corps, under the direction of Mr. Harvey Linton, an expert topographer. Mr. Linton began the surveys in May and concluded in September. In the party were assistant engineers C. A. Phillippi, George H. Strode and Reynold F. Spaeth. Professor J. P. Wentling, of the State Forestry Academy, and twelve students assisted Mr. Linton in the topographical work. Of this force, Mr. Phillippi only remained when Mr. Fleming took charge.

The office force under Mr. Fleming has consisted of three engineering draftsmen, namely, John M. Mahon, Jr., H. A. Otto and F. L. Gardner. Mr. Otto and Mr. Gardner were transferred to engineering inspection work on sewage disposal construction at Mont Alto. Mr. Fleming's field force has comprised Mr. Ennis, resident engineer at Mont Alto in place of Mr. Phillippi, resigned; Chester A. Eckbert and C. R. Forbes transitmen; and Edgar R. Barnes, Ivan M. Glace and George H. Fox, rodmen.

Mr. J. L. W. Gibbs has continued as chief draftsman in charge of map-making. The following men were employed under him to make tracings: J. W. German, Jr., Max Matthes, F. Marion Sourbeer, Jr., Wilberforce Eckels, Jay Gilbert, Robert Hunter, Chester Hogentogler and C. K. Weigle. The last five named men worked during the summer months only. Messrs. Otto, Gardner, Mahon, Forbes and Barnes were engaged part of the time in map-making.

Mr. Moses K. Ely, the chief sanitary field inspector, has been in charge of the office work incident to the supervision of all field officers' reports.

These assistants have comprised the permanent force, but at intervals during the year eight other engineers, residents of the State, were called upon to render assistance of a specific character. Their names are presented in alphabetical order.

L. E. Chapin, Pittsburg; C. F. Drake, Pittsburg; Harvey Linton, Altoona; Charles F. Mebus, Philadelphia; F. H. Shaw, Lancaster; Elton D. Walker, State College; Nathan F. Walker, Athens; D. F. A. Whellock, Warren; F. W. Witherell, Pittsburg.

Mr. Chapin made an examination and report relative to sewerage in the thirty-ninth ward of the city of Pittsburg; on sewerage conditions of Mt. Lebanon School plan of lots and in the Clearfield Addition, Scott township, Allegheny county; and on the plan of the existing sewer in Stowe township and McKee's Rocks.

Mr. Drake investigated and reported on the sewerage of Arnold, of Canonsburg and South Canonsburg and of Brackenridge borough.

Mr. Linton reported investigations of the Westmoreland Water Company system, sewerage at Bellefonte, the water works at Creekside, the system of the Reedsville Water Company, and certain facts relative to the typhoid fever outbreak in Burnham.

Mr. Mebus investigated the pollution of the source of the West Conshohocken Water Works; the sewerage system of Bryn Mawr College; the sewers and sewage disposal fields of the State Hospital at Norristown; and the pollution of Cobbs Creek by the sewers of the city of Philadelphia and other places.

Mr. Shaw examined and reported on the sewers in the following boroughs of Berks county; Bechtelville, Bernville, Birdsboro, Boyertown, Centerport, Fleetwood, Hamburg, Kutztown, Lenhartsville, Mt. Penn, West Leesport, West Reading, Womelsdorf and Wyomissing. He also examined the sewerage system and water works of the State Hospital at Danville.

Prof. Walker examined and reported on the applications for sewerage of Middleburg, Verona, Oakmont, Middletown Drainage Company, East McKeesport, Coraopolis, Ben Avon, Jeannette, Wall, Chartiers township, Watsontown and Hughesville. Also on the Hummelstown Consolidated Water Company and East McKeesport Water Company applications.

Mr. Nathan Walker made a special investigation of the sources of supply of water to Towanda borough.

Major Wheelock made water works investigation at Franklin, Bradford, St. Marys, Reynoldsville, Clarion, South Bradford, Ellwood City, Farewell village, Foxburg, Austin and Sharon. He also made sewerage investigations at Edinboro, Natrona, Franklin, Reynoldsville, East Mauch Chunk, Canton, Kane, White Rock Land Company of Kane, Ellwood City, Corry Tannery, Tarentum, DuBois, Bradford, Clearfield, Sharon and South Sharon. Special investigations and report were made by Mr. Wheelock at the State Hospitals at Warren and Polk relative to improved sewerage and sewage disposal works.

Mr. Witherell looked over and made certain suggestions relative to the filter plans submitted for approval by the Hummelstown Consolidated Water Company, the Dauphin Consolidated Water Supply Company, the Venango Water Company and Cambridge Springs borough.

Field Officers.

Besides the sanitary inspectors in the employment of the Department at the beginning of the year, 24 additional sanitary inspectors have been appointed by the Commissioner of Health. The name, place of residence and date of appointment of each is given below:

Wilson W. Ritter, Harrisburg, January, 1907.
William R. Teats, Burnham, January, 1907.
H. S. Kauffman, Lititz, February, 1907.
J. B. Nightingale, Doylestown, February, 1907.
A. L. Avery, Tunkhannock, February, 1907.
Daniel Zellers, Lebanon, February, 1907.
Thomas Hickey, Pittsburgh, March, 1907.
William P. Miller, Pittsburgh, March, 1907.
J. W. Pinkham, Philadelphia, March, 1907.
Charles T. Maclay, Chambersburg, April, 1907.
Ira F. Zeigler, Carlisle, June, 1907.
W. R. Claypool, Philadelphia, June, 1907.
Warren S. Hood, Philadelphia, June, 1907.
J. Alfred Judge, Philadelphia, June, 1907.
Otto F. Nickel, Johnstown, June, 1907.
Richard F. Einstein, Harrisburg, July, 1907.
Morris Z. Frederick, Telford, July, 1907.

Howard M. Haines, Harrisburg, July, 1907.
Thos. R. Nicholson, North Wales, July, 1907.
Roy Souder, Lancaster, July, 1907.
Charles H. Spelker, Pittsburg, July, 1907.
H. C. Weirick, Enola, July, 1907.
W. W. Reno, Rochester, August, 1907.
W. F. Lerch, Easton, August, 1907.

Twenty temporary field officers were appointed for the summer months. The names of these men are given in alphabetical order. They concluded their work before the end of the year. Most of them were students who returned to college in September.

J. Simpson Africa, Harrisburg.
Richard Bayard, Dauphin.
W. B. L. Drawbaugh, Carlisle.
J. M. Fair, Saltsburg.
M. W. Fleming, Bellefonte.
Clarence Funk, Harrisburg.
James K. Jackson, Harrisburg.
George Karmany, Hummelstown.
Carl C. Koenig, Pittsburgh.
R. W. Lenker, Schuylkill Haven.
Horace S. Miller, Harrisburg.
Thomas R. Moffit, Harrisburg.
James Morse, Philadelphia.
Harry T. Neal, Harrisburg.
Paul Rupp, Lancaster.
F. P. Steck, Shamokin.
R. A. Sawyer, Harrisburg.
James A. Walker, Philadelphia.
H. B. Whitmoyer, Harrisburg.
E. D. Workman, Harrisburg.

Deputy Field Officers, so called, because while being in the employment of a private corporation, they are deputized to represent the Commissioner of Health in inspecting the sanitary condition of property and to report results to him, were appointed in four instances prior to 1907. During the current year no additional deputy field officers were appointed.

On December 31st, 1907, the regularly employed force under my direction was as follows:

Walter S. Hanna, Principal Assistant Engineer, in charge of general office work.
Charles H. Cummings, Principal Assistant Engineer, in charge of special investigations.
Thomas Fleming, Jr., Principal Assistant Engineer, in charge of design and construction.
William H. Ennis, Assistant Engineer.
John M. Mahon, Jr., Engineer and Draftsman.
James L. W. Gibbs, Chief Draftsman.
H. A. Otto, Engineering Inspector.
F. L. Gardner, Engineering Inspector.
Chester A. Eckbert, Transitman.
C. R. Forbes, Transitman.
Edgar R. Barnes, Rodman.
Ivan M. Glace, Rodman.
J. W. German, Jr., Tracer.
Max Matthes, Tracer.
F. H. Sourbeer, Jr., Tracer.
Daniel V. Ness, Chief Clerk, in charge of nuisance complaints.
B. C. Dickinson, Chief Clerk, in charge of local health officer work.
Ellen Johnston, Clerk.
M. Irene Cuenot, Stenographer.
M. Louise Eckels, Stenographer.
Jane Gilbert, Stenographer.
M. Ethel Hurst, Stenographer.
Marie Fasy, Stenographer.
Mary E. Russell, Stenographer.
Mary K. Sourbeer, Stenographer.
M. K. Ely, Chief Sanitary Inspector.
James M. Clark, Field Officer in charge.

David M. Coleman, Field Officer in charge.
John J. Considine, Field Officer in charge.
J. B. Nightingale, Field Officer in charge.
John W. Pinkham, Field Officer in charge.
William R. Teats, Field Officer in charge.
Wilson W. Ritter, Special Field Inspector.
Daniel Zellers, Special Field Inspector.
Ira F. Zeigler, Special Field Inspector.
Henry Andrews, Field Officer.
W. R. Claypool, Field Officer.
John W. Downes, Field Officer.
Richard F. Einstein, Field Officer.
Morris Z. Frederick, Field Officer.
Howard M. Haines, Field Officer.
Thomas Hickey, Field Officer.
Warren S. Hood, Field Officer.
J. Alfred Judge, Field Officer.
H. S. Kauffman, Field Officer.
W. F. Lerch, Field Officer.
Chas. T. Maclay, Field Officer.
William P. Miller, Field Officer.
Thomas R. Nicholson, Field Officer.
Otto F. Nickel, Field Officer.
W. W. Reno, Field Officer.
Roy Souder, Field Officer.
Chas. H. Spelker, Field Officer.
H. C. Weirick, Field Officer.

Mr. E. T. Edwards, City Health Officer for Johnstown, has continued to represent the Department as a special sanitary inspector in the immediate territory beyond the jurisdiction of that city authority.

Local Health Officers.

To better administer the work of the Department throughout the 1,519 second class townships of the Commonwealth, wherein reside over two and a third millions of people entirely without sanitary protection such is afforded by the boards of health of 34 first class townships and the 868 boroughs of Pennsylvania, the Commissioner of Health had the State—66 counties excluding Philadelphia—divided into sanitary districts totalling 733, for each of which he appointed a resident agent.

In so far as possible and practicable, township boundaries were followed. Usually a district comprises two or more townships including the boroughs and cities therein. For instance, Logan township, Blair county, including within it Altoona city and Juniata borough, comprises a district. The city of Pittsburg proper is a district by itself and so is Allegheny city.

The resident sanitary agent of the Commissioner of Health, in so far as his duties relate to the Medical Division of the Department, is confined to the territory wholly without the borough, city and first class township because these municipalities are required by law to have their own organized boards of health; but everywhere within his district regardless of the municipal boundaries the resident sanitary agent is expected to investigate stream pollutions, water works and sewers, to render assistance to field officers and to report to the chief of the Engineering Division.

Many of the agents were not appointed until late in the year and in consequence the system was not fairly under way at the close of the period covered by this report. The work performed for the Engineering Division of the Department by the local health officers appears elsewhere herein.

II. OFFICE WORK.

The general office work necessary to administer the operations of the Division, including general correspondence, recording corporation reports and plans required by law to be filed in the office of the Department or in compliance with the decrees of the Commissioner, attention to petitions and complaints, the issuing of orders for the abatement of nuisances and menaces and the preparation of plans of water sheds for the use of sanitary inspectors in the field, comprises the subjects treated of in this part of the report under the head of Office Work. More or less office work is performed in connection with the other sub-divisions of the organization and it is mentioned elsewhere.

Corporation Reports.

Under provisions of Law No. 182 of the Acts of Assembly of Pennsylvania, approved April 22nd, 1905, entitled "An Act to preserve the purity of the waters of the State, for the protection of the public health," it is the duty of every municipal corporation, private corporation, company and individual supplying or authorized to supply water to the public within the State to file with the Commissioner of Health a certified copy of the plans and surveys of the water works, with a description of the source from which the supply of water is derived.

Under the provisions of the same law, it is the duty of the public authorities having by law charge of the sewer system of every municipality of the State to file with the Commissioner of Health a report of such sewer systems, which shall comprise such facts and information as the Commissioner of Health may require.

Three hundred and eighty-two reports were received. Two hundred and ninety-six of them were from municipal corporations and 86 were from private corporations.

The municipal returns comprised 144 water supply reports and 152 sewerage reports.

The private corporation reports related to water works.

The Department now has on file information obtained in this formal way relative to water supply in 658 places. And relative to sewerage in 396 places.

Recorded Plans.

On December 31st, 1907, there were 3,599 official plans registered in the Department, 2,072 having been added during the year and of the grand total 1,797 accompanied water works and sewerage reports of which 905 were added during the year, 1,592 accompanied water works and sewerage applications of which 885 were added during the year, and 310 were of a miscellaneous character including some of the office working maps and those used in field engineering and inspection work.

Petitions and Complaints.

The Commissioner of Health, in addition to the powers conferred by the new law, has all the powers conferred and must perform all the duties heretofore imposed by law upon the former State Board

of Health, or any member, committee, or officer thereof, including the secretary. The work of supervising the general interests of the health and lives of the citizens of the Commonwealth has been done in part in answer to petitions and complaints and requests for advice. The Commissioner's instructions to give prompt attention to petitions, complaints and requests have been complied with in so far as the Department force made possible.

Hundreds of communications relative to stream pollution by sewage, or by industrial waste, or with respect to insanitary conditions, inferior water supply or ice supply and respecting sewers, sewage dsposal, water supply and general sanitation have received attention.

Three hundred and forty-three complaints and petitions have been acted upon during the year. Two hundred and seventy-five of these cases have been satisfactorily settled.

Fourteen requests for advice relative to water supply, sewerage, garbage disposal, drainage of stagnant water, disposal of creamery wastes and location of cess-pools have been answered.

Common nuisances located within the territory of a municipality having an organized board of health and made the subject of complaint to the Commissioner of Health have been referred by the Department to such local boards. There have been 94 references of this kind during the year as follows:

Stream Pollution. Waynesburg, Lebanon (2 cases), East Berlin, Freemansburg, Brockwayville, Thompson, Derry, Sunbury, Middleburg, Linesville, Lewistown, Troy, Wilkins township, Carbondale.

Well Pollution. Williamsburg and Montgomery.

Sewage in street gutters. Phoenixville, North Braddock, Whitaker, Telford, Blairsville, Chest Springs, York, Delta, Hatfield, Duncannon, New Holland, New Berlin and Jamestown.

Open sewer. Rockwood, Oakmont, Sunbury and New Kensington.

Defective sewer. Monongahela (2 cases), Washington, Juniata, North Braddock and Atglen.

Sewer outlet. Collegeville and Donora.

Insanitary premises. Blairsville, Norwood, Mt. Pleasant, Turtle Creek, New Haven, Grove City, Latrobe, Williamsport (2 cases), Huntingdon, Sheridanville, Wyalusing, Lock Haven, Girardville, Cambridge Springs, Stillwater, South Fork, Berwick, Ambler, Punxsutawney, Ridgway, Siverly, Lehighton, Avoca, Flemington, Pittston, Narberth, Millville, Shamokin, Tamaqua, Old Forge, Leechburg, York Haven.

Dumping grounds. Turtle Creek, Stroudsburg and Carbondale.

Dead Animals. Verona, Eldred and Spangler.

Slaughter Houses. Jersey Shore, Spartansburg, Dushore, Nazareth Roaring Springs and Carrollstown.

Swamp land and stagnant water. Watsontown, Edgewood, Weissport, Wellsboro, Lewistown, Irwin and Lehighton.

At the close of the year of the 94 cases referred to local boards of health all but 26 have been adjusted to the satisfaction of the complainants. The Department will follow the remaining cases to a conclusion.

Two hundred and thirty-five complaints and petitions were made the subject of special investigations and report by the Engineering Division. The localities were usually outside of boroughs and cities

and in territory where only the State Department of Health has adequate jurisdiction. One hundred and fifteen of these commanded the services of engineers, field inspectors, and county medical officers and one hundred and twenty commanded the services of the local health officers. Classified, these subjects were as follows:

Nuisance in streams by sewage and industrial wastes,	57
Impure water and ice supply,	28
Sewerage systems,	6
Defective drainage,	7
Garbage and night soil dumps,	14
Unsanitary premises,	60
Nuisances in street gutters by sewage,	21
Slaughter houses,	18
Reduction, fertilizer and glue works,	5
Dead animals,	7
Mine drainage,	1
Swamp land and stagnant water,	10
Stench from sewage works,	1
	235

The localities of the cases investigated are shown in the following statement:

Nuisances in streams by sewage and industrial wastes.

In Adams county, Tillie village; in Allegheny county, Coraopolis, Wilkinsburg and White Ash; in Beaver county, New Sheffield and Aliquippa; in Bedford county, Sulphur Springs; in Berks county, Ryeland, Womelsdorf, Lyons Station, Boyertown; in Bradford county, Bradford; in Bucks county, Solebury, Langhorne; in Butler county, Mars; in Carbon county, Lehighton (2 cases); in Centre county, Aaronsburg; in Chester county, Whitford, Valley township and Paoli; in Crawford county, Conneaut Lake; in Cumberland county, Mt. Holly, Hunters Run and New Cumberland; in Dauphin county, Dauphin (2 cases) and Beaver Creek Station; in Fayette county, Brownfield, Broad Ford and Connellsville; in Lackawanna county, Scranton suburbs and Carbondale township; in Lancaster county, Lititz suburbs; in Mercer county, Sandy Lake and South Sharon suburbs; in Montgomery county, Centre Square, Narcissa, Gilbertville, Bryn Mawr and Lower Merion township (2 cases); in Montour county, Danville suburbs; in Potter county, Ulysses; in Schuylkill county, Ashland suburbs; in Sullivan county, Muncy Valley and Eagles Mere; in Tioga county, Elkland and Wellsboro; in Union county, Mifflinburg; in Warren county, Sheffield; in Washington county, California; in Wayne county, Orson and Bethany; in Westmoreland county, Penn township and Pennboro suburbs and in Wyoming county, Lake Corey.

Where the above places are not designated as townships, the places named are villages or suburbs of boroughs. Sometimes in the latter instances the inspections involved examinations within the corporate territory of the municipality.

Impure water and ice supply. In Beaver county, Beaver suburbs; in Bradford county, Towanda suburbs (2 cases); in Berks county, Cumru township, Kutztown and Fleetwood boroughs; in Cambria county, Gallitzin borough; in Carbon county, Mauch Chunk; in Chester county, Coatesville; in Cumberland county, Carlisle; in Dauphin county, Middletown and Pillow; in Lackawanna county, Moscow (2

cases); in Lehigh county, Fullerton and Salisbury township; in Lebanon county, South Londonderry township; in Montgomery county, North Wales, Souderton, West Conshohocken and Royersford; in Northumberland county, Sunbury; in Schuylkill county, Tremont; in Susquehanna county, Dimmock; in Warren county, Conewango township and Sheffield; in Wayne county, Honesdale, and in York county, Dallastown.

Sewerage systems. In Cambria county, Hastings; in Carbon county, East Mauch Chunk; in Delaware county, St. Davids; in Montgomery county, Bryn Mawr and Lansdale, and in Perry county, Blain.

Defective drainage. In Columbia county, Espy; in Greene county, Franklin township; in Indiana county, Saltsburg; in Lackawanna county, Moscow; in Lehigh county, Salisbury township; in Montgomery county, Ambler, and in Washington county, Washington.

Garbage and night soil dumps. In Allegheny county, Coraopolis, Homestead and Braddock; in Berks county, Bernville; in Bucks county, Sellersville; in Cambria county, Johnstown; in Centre county, Penn Hall (2 cases); in Elk county, Ridgway; in Fayette county, Uniontown; in Lebanon county, Cleona; in Luzerne county, Harvey's Lake; in Montgomery county, Ardmore, and in York county, West Manchester township.

Unsanitary premises. In Allegheny county, Hoboken, Wilkinsburg, Coraopolis, Crafton, Oak Station, Homestead and East Pittsburg; in Berks county, Robisonia and Leesport; in Blair county, Frankstown; in Centre county, Spring Mills; in Chester county, Kirklynn, Devon and Berwyn (2 cases); in Clearfield county, Windburn; in Clarion county, New Bethlehem; in Dauphin county, Elizabethville and Linglestown; in Delaware county, Llanerch, Trainor, Lester, Collingdale, Darby township and Chadds Ford; in Fayette county, Georges and Connellsville; in Franklin county, Lehmasters; in Greene county, Waynesburg; in Huntingdon county, Broadtop; in Lancaster county, Upper Leacock, Eden, Falmouth and West Donegal township; in Lehigh county, Laurays; in Mifflin county, Yeagertown and Newton Hamilton; in Monroe county, Pocono Pines; in Montgomery county, Narcissa, Haverford, Glenside (2 cases), Ardmore (2 cases), Merion (3 cases), Edge Hill, Abington township, Bryn Mawr and East Greenville; in Northampton county, Rosetto and Pottsgrove; in Pike county, Greentown; in Snyder county, Paxtonville and Kantz; in Susquehanna county, Liberty township and Montrose; in Union county, White Deer Water Company; in Wayne county, Gallilee.

Nuisances in street gutters by sewage. In Allegheny county, Penn township and Idlewood; in Bucks county, Perkasie; in Cambria county, Salix; in Chester county, Devon; in Clearfield county, Decatur township; in Dauphin county, Fort Hunter and Highspire; in Delaware county, Haverford township, Fairview and Fernwood (2 cases); in Fayette county, Ohiopyle; in Forest county, Marionville; in Lebanon county, Hebron; in McKean county, Hazlehurst; in Montgomery county, Bryn Mawr and Flourtown; in Schuylkill county, Shenandoah; in Washington county, California, and in Westmoreland county, Derry township.

Slaughter houses. In Adams county, Cashtown; in Bedford county, Gapsville; in Butler county, Harmony; in Cambria county, Vintondale; in Centre county, Phillipsburg; in Huntingdon county, Logan township; in Indiana county, White township; in Lackawanna county, Waverly; in Lancaster county, Lancaster; in Lebanon county, Campbellstown; in Mifflin county, McVeytown; in Northumberland county, Shamokin and Mahanoy; in Somerset county, Stoystown; in Susquehanna county, Liberty township; in Union county, West Milton; in Washington county, Hackett, and in Westmoreland county, Unity township.

Reduction, fertilizer and glue works. In Northumberland county, Shamokin; in Somerset county, Glade; in Tioga county, Westfield; in Westmoreland county, West Newton, and in York county, York.

Dead Animals. In Bedford county, West Providence; in Cambria county, Jackson; in Chester county, Kennett township; in Lehigh county, Washington township; in Luzerne county, Sugar Loaf township; in Mercer county, Greenville, and in Montgomery county, Hoyt.

Mine drainage. In Cambria county, Salt Lick Creek.

Swamp land and stagnant water. In Allegheny county, Boston; in Centre county, Port Matilda, Aaronsburg; in Lackawanna county, Clarks Summit; in Potter county, Galeton; in Montgomery county, South Hatfield and Lower Merion township; in Northumberland county, Dewart, and in Westmoreland county, Bolivar and Bairdstown.

Stench from sewage works. In Delaware county, Ithan.

Some of the petitions came from local Boards of Health and borough authorities and in these cases the investigations were in the towns.

Orders of Abatement.

To prevent causes of disease and mortality, so far as the same may be caused by public menaces and nuisances, more especially outside of municipalities on the water sheds of the State, the Commissioner of Health has the power and authority to order such nuisances and menaces to be abated and removed. Upon examination made by any persons duly authorized by the Commissioner of Health so to do, information as to the facts is submitted to this office and subsequently an order to abate or remove may be issued. These orders are signed by the Commissioner and served by the field or local health officers. The abatements listed below were had by formal notification. Many hundreds of properties have been put in sanitary condition on inspection and verbal request by the field or local health officer.

Three thousand and three hundred and eighty-nine written orders have been prepared and issued during the year. Two thousand eight hundred and fifty of them were issued as the direct result of investigations on water-sheds by the division field officers, and all but one hundred and sixty-seven of the menaces were found existing on drainage areas feeding public water supplies. They are more fully reported elsewhere herein. The remaining five hundred and thirty-nine written orders were of a miscellaneous character reported, in a large majority of the cases, by the local health officers who served

the notices. Many of the other notices were also served by the local health officers under the supervision of the Department's field officers.

Drafting.

The map-making force was limited to one man up to the latter part of May, except when assistant engineers and field officers may have temporarily engaged in the preparation of plans in connection with work to which they were specifically assigned. After June first, the force varied from three to eight men. In the latter part of June four rooms on the fifth floor of the Capitol were secured and they have since been used by draftsmen of the Department engaged in map making.

During the year maps of forty different counties, each showing townships, boroughs, cities, postoffices, villages, railroads, street car lines and streams, have been prepared with care. They are to serve as a basis for general reference and more particularly as a foundation for future map making of districts within the county. The uniform scale of these maps is three miles to one inch.

An atlas of health officer districts was compiled. The atlas comprises sixty-six sheets, a county to each sheet. On each map is shown the county and township lines, the location of boroughs and cities and the boundaries of the sanitary districts, there being in all seven hundred and thirty-three such districts. Each district is designated by a number on the sheet. There are three copies of this atlas in daily use in the Department.

In this connection a book was prepared and is kept up to date by counties, showing the number of each sanitary district in the county, the area thereof, the cities, boroughs, first and second class townships, and the population of each included in this district. These maps are drawn to a scale of three miles to one inch.

Special inspection of the sources of water supply to the railroads, the stations, yards, shops and water in places thereof throughout the Commonwealth has necessitated the drawing of special maps of these places and the source. One hundred and fifty maps, each sheet forty-five inches long by twenty-five inches wide, have been compiled from the United States Topographical sheets and from various other sources and arranged into three folios. On a scale of one inch equal one mile, these maps show boroughs, township and county lines, villages, post-offices, streams and the railroads. On each map will be put the location of springs, wells, streams, which are the sources of water supply to the railroads, and the location of the water pipes, reservoirs and tanks, pump houses and standpipes.

In connection with and to facilitate the work of a sanitary survey of the sources of major pollutions on the watersheds of the Allegheny river and the Monongahela river in Pennsylvania, a map of each basin has been prepared and copies thereof have been supplied to the officers in charge of field work in these districts. This is also true with respect to the watersheds of the Beaver River, Perkiomen Creek, Tacony Creek and Gulf Creek and also with respect to the watershed of Conodoguinet Creek, above the intake of the Carlisle water works, Conocheague Creek above Chambersburg water works intake, and Crum Creek above the Springfield Water Company's intake.

Special inspection of the water sheds furnishing the supply to Lebanon, Reading and Huntingdon have necessitated the making of maps in the upper Conestoga basin in Lebanon and Berks county, and plans of the water sheds of Burnhart and Egelman near Reading, and Sandstone Creek near Huntingdon.

To facilitate the work of a stream pollution inspection for the abatement of every nuisance and menace, detailed township maps have been prepared in folio form covering all the territory of the watersheds yielding a supply of water to the public in the following places, namely the cities of Lancaster, New Castle, Reading and York and the borough of Selins Grove; and the streams named in their respective order are Conestoga Creek, comprised in a 16 sheet folio; Shenango River, comprised in a 38 sheet folio; Maiden Creek, comprised in a 14 sheet folio; Penns Creek, comprised in a 17 sheet folio; and Codorus Creek comprised in an 18 sheet folio.

Some miscellaneous map making in connection with pollutions along Harveys Lake, in connection with typhoid outbreaks at Franklin, Lititz and Manheim, and in connection with the consideration of sanitary problems of the central poor district in Luzerne county, the pollution of Quittapahilla Creek near the city of Lebanon has all told required the expenditure of not a little time.

For maps made in connection with Mt. Alto work and the sanitary survey at Mt. Gretna reference may be had to the special reports.

III. ENGINEERING.

The review of plans of proposed sewerage and water works systems, and of extensions to existing systems, and the making of invetigations and reports in relation thereto has been an important part of the work performed by the Engineering Division.

There were two hundred and thirty-six sewerage and water works applications received during the year, of which one hundred and sixty-five pertained to sewers and seventy-one to water works. Of the sewerage applications seventeen were received from private sources and the remaining one hundred and forty-eight were sent in by municipalities. Of the water works applications, fifty-five were submitted by private corporations and sixteen by municipalities.

The sewerage applications may be classified as follows: Sixty-eight for separate systems for sewage only, 71 for combined systems to receive both sewage and storm water and 26 for sewage disposal works.

The applications for sewage disposal plants arranged in order by dates are given below:

1. Warren State Hospital, Warren county.
2. Greenville, Mercer county.
3. State Hospital for Insane, Danville, Montour county.
4. Mt. Carmel, Northumberland county.
5. State Hospital for Insane, Polk, Venango county.
6. Oxford Drainage Company, New Oxford, Adams county.
7. New Castle, Beaver county.
8. Bureau of Filtration, Pittsburgh, Allegheny county.
9. Bristol, Bucks county.
10. East Mauch Chunk, Carbon county.
11. Saint Marys, Elk county.
12. Chambersburg, Franklin county.
13. York, York county.

14. Village of Palmerton, (N. J. Zinc Company), Carbon county.
15. Northumberland, Northumberland county.
16. New Wilmington, Lawrence county.
17. Chambersburg, Franklin county.
18. Carlisle, Cumberland county.
19. New Wilmington, (Revised Plans,) Lawrence county.
20. Indiana, Indiana county.
21. Allegheny City Home, Allegheny county.
22. Derry, Westmoreland county.
23. Presbyterian Home, Devon, Chester county.
24. Osborne, Allegheny county.
25. Aliquippa, Beaver county.
26. Indiana, Indiana county.

The water works applications may be classified as follows:

Twenty-four for ground water sources, and 47 for surface sources in 11 cases of which the plans provided for purification by filtration of the surface source and in six additional instances the surface water was being filtered at the time application for extensions were made namely in the case of the Home Water Company of Spring City and Royersford, the Bethlehem City Water Company of South Bethlehem, the Sunbury Water Company of Sunbury, the New Chester Water Company to supply Eddystone borough via the Ridley Water Company, the New Chester Water Company for the supply to Marcus Hook, and the Armstrong Water Company at Wickboro.

The applications for water filtration plants arranged in order of date of receipt are given below:

1. McKeesport, Allegheny county.
2. Hummelstown Consolidated Water Company, Dauphin county.
3. Cambridge Springs, Crawford county.
4. Tarentum Water Company, Allegheny county.
5. Lancaster, Lancaster county.
6. Steelton, Dauphin county.
7. Dauphin Consolidated Water Supply Company, (Enola,) Cumberland county.
8. Venango Water Company, Franklin, Venango county.
9. Ridgway, Elk county.
10. York Water Company, York county.
11. Hummelstown Consolidated Water Company, second application.

Of 236 applications received during the year, 155 have been examined and reported upon besides 31 applications left over from 1906, making a total of 186 applications investigated and reported upon during the year. In 111 cases conclusions have been reached and a permit or decree duly issued by the Commissioner of Health.

Of the 111 cases, 25 related to water works and 86 to sewerage and disposal works.

With respect to water works decrees, 17 embraced surface sources of which in 11 cases adequate purification by filtration was required and 8 embraced ground sources. The 11 cases where filtration was required are stated below in order of issuance.

1. Lebanon City on 1906 application.
2. Warren Water Company of Warren borough.
3. Ellwood Water Company of Ellwood City borough.
4. Clymer Water Company of Indiana borough.
5. Ridgway borough, Elk county.

The remaining cases were those of McKeesport, Cambridge Springs, Hummelstown, Tarentum, Steelton and Franklin, mentioned in the above list of 1907 applications.

With respect to the sewerage decrees, 19 involved sewage disposal works and the other 67 related to sewers and ultimate treatment plants as more fully hereinafter appears. The Presbyterian

Home application for sewage disposal was dismissed. Sewage disposal applications in nine instances are pending, namely, Nos. 1, 3, 4, 7, 15, 16, 19, 22 and 26 in the above table.

A brief summary of the applications received and acted upon relative to water works and sewerage since the inauguration of the Department is given below:

Applications received in 1905 and 1906,	155
Applications received in 1907,	236
Total,	391
Applications acted upon in 1905 and 1906,	74
Applications acted upon in 1907,	159
Total,	233

There were 154 applications pending at the close of 1907, 4 having been dismissed. Fifty-six of them were water and ninety-eight sewerage and disposal applications. Twenty-seven of the water works and forty of the sewerage applications were investigated, leaving 87 to be investigated.

The 391 applications comprise 105 water works and 286 sewerage systems. Two hundred and fifty-three of the latter were municipal plants and 33 private works, and of the former 82 were owned by private and 23 by municipal corporations. It may be interesting to note that 35 of the water applications concerned ground sources and 70 concerned surface sources, in 7 instances of which the water was being filtered and in 13 cases new filters were contemplated. Also with respect to the sewerage applications, 107 related to separate sewers, 130 to combined sewers, 9 to separate and combined and 40 to disposal works.

So it appears that plans for 20 water filters and 40 sewage treatment plants have been considered and passed upon, or will engage the attention of the Department at an early date.

WATER WORKS.

Water Works Permits and Decrees Issued by the Commissioner of Health up to January 1st, 1907.

This work has been done under Act 182 approved April 22nd, 1905. The law is entitled "An act to preserve the purity of the waters of the State for the protection of the public health." The term "waters of the State" is defined to include all streams and springs, and all bodies of surface and of ground water, whether natural or artificial within the boundaries of the State.

Acting under this law which prescribed that no water works for the supply of water to the public shall be constructed or extended or an additional surce of supply be secured, without a written permit to be obtained from the Commissioner of Health, the scope of inquiry in each case has been strictly confined to whether the supply be prejudicial to public health.

The virgin waters of the State are pure. They gather in their devious courses on or below the surface of the ground foreign matter, oft times of a poisonous character. To preserve the purity abso-

lutely is impossible, but approximations may be achieved. The results frequently concern the removal of impurities injurious to public health under conditions demanding continual supervision by the State.

Precedent to judgment in any particular case, the full information as to the source of supply and capacity the manner of collection and the means of distribution, is indispensable; with respect to the source, principally as to danger to be guarded against and means necessary for protection; with respect to capacity, because, besides other reasons, where a supply be altogether good and limited, consumers may be compelled by shortage to have frequent recourse to private wells and neighborhood springs in close proximity to and polluted by cesspool or privy drainage or other sewage contamination, or because recourse may be frequently had to a polluted stream as the supplementary supply and thus spread disease in the town—conditions which the law does not contemplate the State authorities should overlook or sanction; with respect to details, because, besides other reasons, the interests of the public health require that ample facilities for quick drainage or shutting off of any infection in any part of the system shall be provided, or where a filter may amply purify a water in ordinary times, during a fire the speeding up may be at a rate entirely beyond the purifying capacity and thus sewage water may be introduced into town, or direct recourse may be had to raw creek water for emergencies.

In connection with the subject, it may be important to know about the private wells and springs in the town.

For the dissemination of information, the permits set forth quite fully the local situation leading up to the conditions under which an additional source of supply or an extension to existing water works will not be prejudicial to public health.

The stipulations refer to provision for removal of sources of pollution, protective measures such as sanitary patrol of water sheds and reports thereof, efficient operation of purification works, remedial measures to be adopted by approval or advice of the Commissioner of Health in case the supply or any part of the water works system becomes prejudicial to the public health and other matters, all appearing in the various cases herein set forth in full and arranged alphabetically.

BADEN, BEAVER COUNTY.

This application was made by the borough of Baden, Beaver county, and is for permission to install a municipal water works plant for the supply of water to the public in said borough.

It appears that Baden borough is a residential community of about five hundred citizens, located on the east bank of the Ohio River, in the southeast part of Beaver county, twenty miles below Pittsburg and about five miles above Rochester, where the Beaver River enters the Ohio River.

While the municipal boundaries are one and twenty-five hundredths square miles, only a small part of the incorporated territory is built up. Most of the area is under cultivation. Paralleling the river and east of it about two thousand feet is a ridge elevated about two hundred and sixty feet above the valley and extending throughout the borough, and on the slope from the summit to the banks of the Ohio and immediately south of a stream called Tevebaugh Run is the village. The main line of the Pittsburg, Fort Wayne and Chicago division of the Pennsylvania Railroad system passes along the railroad bank through the town. The bank is forty feet in height and twice in twenty years, once in eighteen hundred and eighty-four and the last time in March nineteen hundred and seven, the freshet flow reached the railroad tracks and submerged them.

Just east of the railroad is the Ohio valley thoroughfare known as State Road. It was originally laid out by the Government from Pittsburg westerly. In this highway the Pittsburg Railways Company is now laying its trolley line from the Beaver Valley through Baden to connect with the Pittsburg lines. The purchase price of the Baden borough franchise for this trolley right of way was twenty-five thousand dollars cash and other considerations. The cash has been set aside to defray the cost of the municipal water works plant.

Tevebaugh Run rises in the uplands east of the ridge and flows down for a distance of about three miles, draining a farming district and natural gas and oil fields and passing through the ridge in a deep valley to the river. The other runs in the borough do not have channels through the ridge but rise at the summit thereof.

There are outcroppings of the Kittanning vein of coal in the borough and there are also strata of fire clay. The dip is toward the Ohio and above the impervious layers numerous springs appear. This source of drinking water is availed of by some of Baden's citizens.

At the present time the inhabitants derive their drinking water from dug wells, cisterns and springs located on individual properties.

The top soil is not well adapted to percolation. This accounts for the few cesspools there. Kitchen water is usually disposed of onto the surface of the ground, or drained to street gutters. Excrement is placed in privy vaults which are holes dug in the ground. As soon as one vault becomes filled, the superstructure may be moved therefrom and located over a hole. The dug well supply and some of the springs are suspicious on this account. Any percolation from soil pollution sources is liable to reach the shallow dug wells and the springs if the latter be at the lower elevation. There are a few private sewers, but a privy vault exists on most every property. It is evident that both public water works and sewerage are desired as public health precautions.

The desire on the part of the residents for modern plumbing facilities in their dwellings, and the necessity of these things to promote the development of the borough and its best sanitary welfare, is set forth by the petitioners as sufficient reason why the application should receive favorable consideration.

It appears that a rapid development is reasonably anticipated. Across the river, for several miles along the banks, are being erected enormous steel plants which afford employment to thousands of men. A charter for a river bridge connecting Baden with the opposite shore has recently been granted by the Commonwealth, and this increased facility for public highway travel, together with the industrial boom in the district, seems to assure a rapid growth for Baden. This argues in favor of the installation of some other water supply than the private dug wells and springs above referred to.

A public sewerage system is also contemplated and plans therefor are now before the Commissioner of Health for approval.

The source of supply of the proposed municipal water works plant is a series of driven wells located in the gravel shore of the river in the lower part of the borough at the mouth of Tevebaugh Run.

The water is to be drawn from the wells and forced through the street pipe system into a standpipe to be located on the ridge in the borough from whence it is to flow by gravity to the town.

The plans provide for a pipe in every street in the borough. The pipes are to range in size from four inches to eight inches in diameter, and there is to be about one mile of four inch, six inch and eight inch pipe respectively. The eight inch pipe leads from the pump house to the stand pipe on the hill. The water is to be pumped into the street system, the overflow being into the tank. Fire hydrants are to be placed at convenient points about the town. A blow-off is provided at the pump house. All but a small part of the pipe system will be drained thereby.

The stand pipe is to be constructed of steel and is to be twenty-three feet in diameter and twenty feet high. The thickness of the shell will admit of increased height if this should prove desirable in the future.

The pump house is to be located on the river bank west of the railroad at the foot of Lessing Street. As hereinbefore stated, twice in twenty years high water has reached this point. The station is to be of brick forty feet long by thirty feet wide, resting on a concrete foundation and a brick pump chamber, the latter being fifteen feet in diameter and twenty-eight feet deep.

This chamber is to rest on a concrete foundation, three feet in thickness and is to be made water tight; but at its bottom, which the plans provide shall be elevated three feet above the nine foot stage of the river, is to be a drain for the removal of any water in the chamber at times when the stage of the river may be below said chamber. There is a check valve provided on the drain and also a small centrifugal pump for the purpose of freeing the chamber of any water which may enter it when the river is high.

In the engine house is to be installed a thirty-five horse power gas engine, and in the pump chamber one single acting triplex deep well pumping engine, having a daily capacity of four hundred and fifty thousand gallons. There is room for duplicate installation.

A twelve inch suction pipe extends from the pump well to the driven wells nearby. Six eight inch wells have been driven on the river bar to a depth of twenty feet and have been connected up to the main suction. The casing of

each well is eight inches in diameter, the lower five feet are perforated with three-fourth inch holes and the pipe has been driven through fifteen feet of gravel and sand, two feet of river hardpan and into two feet of water bearing gravel below. On top of each casing is screwed a cap through which a four inch suction pipe is inserted to within one foot of the bottom of the casing pipe. This vertical suction is connected to the horizontal suction main in the usual manner. The space between the four inch pipe and the rim of the opening in the casing cap is made securely tight by soft leading packing.

The wells have been tested to a capacity of about one hundred gallons per minute each and during this pumping test the water level in the well nearest the pump was lowered about one foot only. Ordinarily, when the river is in a low stage, the water stands in each well at a hight slightly above the river. The top of the main suction and hence all of the piping is buried at least three feet below the bed of the river channel in compliance with the regulation of the Federal Government of whom a permit was first obtained. At the present time the main is from one to two feet below the river level during the low stage season, but when dam Number Five which is being constructed by the Federal Government in the river at Freedom four miles below, and is a collapsible dam, is put in commission, which will be during the latter part of the current year, all of the piping will be permanently submerged about eight feet below the river level. Dam Number Six which is five miles below dam Number Five, and below the Beaver River, has been in operation for a number of years and it is reported that the river stage has been such during this time that the dam which is also collapsible has been down approximately fifty per cent. of the time.

Detail plans of the pumping station, wells and appurtenances and of the stand pipe have not been submitted to or filed in the State Department of Health.

It is reported by the local authorities that the well water proves to be soft and always clear, regardless of the sediment in the river water, and that it is desirable for drinking purposes. The supply is abundant and there seems to be no local reason why the quality thereof should not be equal to that of other municipal supplies obtained in a similar manner along the Ohio River. Nevertheless, the fact should not be overlooked that so long as the Ohio River receives the sewage of the cities and towns above Baden, there will always be a possibility of serious pollution of the subterranean stream from which the borough's supply is to be drawn. A natural impervious roof separates the surface from the subsurface stream and if this roof remain impervious or its integrity be not disturbed, the subterranean waters may be reasonably safe. Even in this case the manner of drawing this underground supply which undoubtedly is fed from the river itself to a greater or less extent, and the apparatus used therefor must receive constant and vigilent supervision, but who shall say that a break or fault does not exist or may not occur by means of which the public water supply may be poisoned.

It is the bounden duty of the public authorities to safeguard the proposed supply in so far as they may have jurisdiction to do so. The State Department of Health is undertaking to bring about the final discontinance of the discharge of sewage into the Ohio River or its tributaries above Baden. There is one public sewer in the borough and several private ones now emptying their contents into the river at points ranging from one thousand to four thousand feet above the driven wells. After the pool formed by dam Number Five is created, the danger of percolation of surface water befouled by this sewage through leaky joints into the town's supply will be increased. If the borough's sewer plans are carried out the nearest sources of danger will be removed, and it will be many years before the gross pollution of the Ohio by up stream municipal sewage will have been materially reduced.

It appears that every precaution has been taken in the design and construction of the wells to safeguard the public health. Excepting a filtration plant, nothing remains to be suggested other than careful and regular inspections of the driven well system of piping. These inspections should be a matter of official record and should be reported to the State Department of Health.

Tevebaugh Run is not a suitable source of supply, and the Department is not informed of any other source available within the borough's financial resources. Neither can the borough afford to install a filter plant. This, however, should be done as soon in the future as the municipal finances will permit, more as a cheap and desirable insurance against infection, than of necessity so far as the quality of the supply may be revealed by bacteriological tests.

Regular samplings of the well water should be made by the borough authorities and sent to the laboratories of the State Department of Health. At least one sample should be collected weekly.

It has been determined that the proposed source of supply and the water works system will not be prejudicial to the public health, and a permit is hereby and herein granted therefor, under the following conditions and stipulations:

FIRST: That complete plans of the wells, pumping station, stand-pipe and showing all valves, piping, machinery, etc., shall be prepared and filed by the borough in the State Department of Health within sixty days of the date of this permit.

SECOND: That at the close of the season's work, the borough shall file a plan of the water pipes laid during the season, together with any other information in relation thereto that may be required by the State Department of Health.

THIRD: Regular reports of the operation of the plant, including inspection of all piping and apputenances of the driven well system shall be made on blank forms to be provided by the State Department of Health.

FOURTH: The borough shall regularly and at such times as requested by the State Department of Health, collect samples of the well water and express them to the State laboratories for tests, but these tests shall not relieve the borough authorities from the responsibility of supplying a pure and wholesome water to the public within the borough. Daily examinations shall be made by the local authorities of the well water and if at any time such water appears to be even slightly cloudy or discolored, thereupon, forthwith, notice shall be served upon the water consumers to boil the water.

FIFTH: If at any time in the opinion of the Commissioner of Health the source of supply shall have become prejudicial to the public health, then the borough shall adopt such remedial measures as the Commissioner of Health may suggest, advise or approve.

Harrisburg, Pa., July 23, 1907.

BETHLEHEM, NORTHAMPTON COUNTY.

This application was made by the Board of Water Commissioners of the borough of Bethlehem, Northampton county, and is for advice relative to obtaining a new source of supply from the Delaware River and on three specific matters as follows:

"First, is it possible for a water company to be formed and chartered by the State in which the charter stock-holders are various contiguous municipalities? In other words, can municipalities combine to form a water company, thus retaining the municipal ownership, increasing consumption, and decreasing cost?"

"Second, does the seven per cent. limit of bonded indebtedness apply to water bonds? That is, since water bonds represent productive property, in the case of Bethlehem, a large profit—are they not separate from the bonded indebtedness of the borough, and should not the borough, therefore, have the right to its indebtedness for water purposes under different debt regulations from those applying to bonds that are laid against non-productive property like streets and borough houses?"

"Third, what do you think of the Delaware scheme as outlined? Have you any suggestion to offer that may assist us in tackling the problem?"

It appears that the borough of Bethlehem is located on the north bank of the Lehigh River opposite South Bethlehem and about five miles below Allentown and about twelve miles above where the Lehigh empties into the Delaware River.

The municipality includes what was formerly the borough of West Bethlehem, Lehigh county. In the year one thousand nine hundred, Bethlehem proper had a population of seven thousand two hundred and ninety-three and West Bethlehem three thousand four hundred and sixty-five. Now the combined population is estimated to be sixteen thousand, an increase of about five thousand or nearly fifty per cent. in seven years. This increase is attributable to the growth of iron, steel and cement manufactories and allied industrial activity in the vicinity of the Bethlehems.

West Bethlehem is mostly a residential section of the town located on a bluff with the Lehigh River at its south base and the Monocacy Creek at its east base forming the boundary line between Lehigh and Northampton counties and the physical division between Bethlehem and West Bethlehem. Bethlehem proper is on a hillside, the principal part being an elevated plateau, the drainage principally into the creek.

There are no sewers in the borough, but there are reported to be storm drains. The custom prevails of drilling a hole into the underlying limestone rock on each individual estate and despositing sewage therein. The liquid flows away through crevices.

The old town is historical and aristocratic in appearance. Street improvements have been extensive. In the year one thousand nine hundred and six, the assessed valuation of Bethlehem proper was four and a quarter million dollars and for the entire borough six million dollars. The bonded indebtedness is reported to be two hundred and thirty-six thousand three hundred dollars. If this be true, the borrowing capacity of the municipality does not exceed one hundred and eighty-four thousand dollars on this basis.

The surface of the public water supply in Bethlehem proper is a spring in the Monocacy Creek valley. West Bethlehem is supplied by a private water company. The Bethlehem plant is owned by the town. The spring is within the borough limits, water is pumped therefrom against a head of about two hundred feet to two stand-pipes located on the same lot side by side, from which the water flows by gravity through the street mains. The plant was

purchased by the town in the year one thousand eight hundred and seventy-two. Originally established in the year one thousand seven hundred and sixty-one, the system is said to be the second oldest public water works in the United States. Since the year one thousand eight hundred and seventy-two, the borough has installed improved machinery, stand-pipes and cast iron street mains.

The daily consumption is about one million two hundred thousand gallons and is delivered to the stand-pipes by a Deane compound single-acting pumping engine which was installed in the year one thousand eight hundred and eighty-nine. The old Worthington pump installed in the year one thousand eight hundred and seventy-three is kept for emergencies. Both pumps are much worn and liable to a breakdown at any time. The stand-pipes are circular, built of iron, one being twenty-four feet in diameter by forty feet high and the other fifty feet in diameter by fifty feet high. They are located at the highest point in the municipality. There are dwellings in the immediate vicinity. The pressure when the tanks are full varies from eighty pounds in the lower to about twenty pounds in the higher districts. Plans of the system have not been filed with the Department and, therefore, details with respect to the service are not known to the State at the present time, but it appears that the pressure is not satisfactory for fire service nor for domestic service in the higher parts of the town. The mills are located along the river at the foot of the bluff between the canal and the river. They are operated by water power supplied by the canal which is owned by the Lehigh Coal and Navigation Company. The silk mills are in the valley of the Monocacy Creek above the water works plant. These industries are all west of the creek and hence do not make demands upon the town's supply. The daily consumption, therefore, of one million two hundred thousand gallons is for domestic use only. Service taps are metered.

The spring from which the supply is taken is located at the foot of the bluff on which the business part of the town is built, about twenty-five feet back from Mill Race and one hundred feet from the creek. The spring is a flowing one, is walled up, housed over and delivers water by gravity to the pumping station, located about two hundred feet down stream. The supply is nearly exhausted daily. An emergency intake pipe is provided whereby raw creek water may be pumped into the system.

The pumping engines are operated on an average of twelve hours daily.

The limestone deposit from which the spring issues is said to have its strike north and south and pitches in such a way as to premit house drainage from West Bethlehem to find its way towards the spring. In fact, subterranean connections may be so extensive that an opening up of direct communication between the fissures which receive the town sewage and those supplying the spring might happen at any time. At one time the Water Board made an attempt to obtain more water by sinking a well between the spring and the pump house. This well was drilled three hundred feet deep and water was obtained in abundance, but the quality was so inferior that it could not be used for drinking purposes.

Out of twenty-nine samples of water taken from the existing spring and tested during the year one thousand nine hundred and six and up to date in the year one thousand nine hundred and seven, coli communis were present in twelve samples or forty-one per cent. of the time and in sufficient numbers to indicate sewage contamination calling for remedial measures.

Such records as the Department has for ready reference do not show the prevalence of typhoid fever in Bethlehem in excess of that of surrounding municipalities. In the year one thousand nine hundred and three, the disease was epidemic in all of the Bethlehems. Because an epidemic has not occurred among the users of the spring water is no reason why the Bethlehem spring should be considered a safe source. The risk run by the borough's consumers involves such grave consequences, that there is but one position which the State can assume relative to the supply, namely, that it is dangerous and should be abandoned unless the water be filtered.

West Bethlehem's supply is wholly furnished by the Bethlehem City Water Company of South Bethlehem. The water is taken from the Lehigh River and filtered. The filter plant was installed and put in operation during the year one thousand nine hundred and five to prevent occurrences of typhoid fever epidemic which in times past have been attributed to the sewage pollution of the river.

The pump house and filters are in Fountain Hill borough. The company supplies this borough of fifteen hundred population, which is a suburb of South Bethlehem; South Bethlehem, population fifteen thousand, Northampton Heights borough, fifteen hundred population, the suburb to the east, and on the opposite side of the river West Bethlehem, five thousand population, and the villages of Rittersville and East Allentown, combined population two thousand, making in all, twenty-five thousand people, supplied by this system.

It is reported that further increase of valuations in taxable property have been made this spring and that Bethlehem borough may find that its borrowing capacity is in the neighborhood of two hundred thousand dollars. The receipts from the water works are about sixteen thousand dollars per annum and the expenditures nine thousand dollars, leaving a net income of seven

thousand dollars which is turned into the borough treasury for current expenditures. Since there is no law in Pennsylvania which exempts productive municipal water works from the action of the constitutional debt limit, it is plainly evident that even if the borough of Bethlehem should so improve its water works property as to make it capable of earning interest and sinking fund charges, upon a capital investment of half a million dollars, yet the municipality could not legally guarantee investment bonds for more than two hundred thousand dollars, if this amount were the constitutional limit of its indebtedness. However, such earning capacity if pledged by the municipal authorities as security for payment of the purchase of water by wholesale from a private corporation making the capital investment of half a million dollars for water supply purposes might be legally accomplished and in this way enable the borough to secure an adequate supply of pure water.

If the borough purposes to construct its own works, then it is limited to an expenditure of not over two hundred thousand dollars and probably less.

There is legislation, which if approved will enable municipalities to purchase private water works systems and for the payment thereof to issue bonds guaranteed wholly and solely on the water works plant as security. The payment of such a debt can in no way become an obligation upon the general tax levy, thus operation to exempt such municipal water works bonds from the constitutional indebtedness.

With respect to the Delaware River, it may be said that it is a superior source of surface water supply. The waters are soft, clear and subject to little pollution especially above Martin's Creek which is about seven miles above Easton. The project submitted for consideration comprises a plain sand filter plant, pumping station and ten and five-tenths miles of rising main to a storage reservoir on Quaker Hill three hundred and forty feet above the river, and a gravity supply main from this reservoir to the town distant three and twenty-five hundreths miles. The estimated cost of the project is five hundred and thirty-five thousand dollars, itemized as follows: Intake, pumps and filter plant, one hundred and sixteen thousand dollars, main station and rising main, two hundred and thirty thousand dollars; reservoir and supply main, one hundred and nineteen thousand dollars; engineering and contingencies seventy thousand dollars, a total of five hundred and thirty-five thousand dollars.

The rates at present produce an annual income of about sixteen thousand dollars. There are said to be nine thousand water takers, which is equivalent to a per capita revenue of about one dollar and eight cents. As stated in the borough's report, the average per capita income from American municipally owned systems is about two dollars and fifty cents, and in many cities between three and four dollars, so it is argued that if greater revenues are necessary to secure a larger and better water supply, the rates could be properly raised to at least three dollars per capita. If this were done this would increase the use of water and hence substantially increase the revenues. Ample fire service would justify higher rates, and it is possible if the municipal system were extended into that part of the borough called West Bethlehem now supplied by the private water company, that further increase in revenues would obtain. It is quite safe to assume, however, that for the first few years the total receipts would be insufficient to make the investment in the Delaware river scheme a profitable one were the enterprise promoted by the municipality.

It has been represented that the city of Allentown stands in need of an abundant supply of soft and unqualifiedly pure water, and since this city owns its own water works, provided the municipalities of Allentown and Bethlehem were to build joint works with the Delaware river as the source, the per capita cost would be so reduced as to bring the project within the means of each place. As a municipal undertaking however, it is not possible under the laws of Pennsylvania, for a water company to be formed in which the stockholders are various contiguous municipalities. An act authorizing municipalities to issue bonds secured by municipal water systems failed of passage at the present legislative session of the General Assembly.

The field, however, it worth looking over by capitalists who might care to supply filtered Delaware water wholesale under conditions mutually satisfactory to all concerned.

At one time, Bethlehem led the country in public water works. Conditions have changed, the present source is dangerous and insufficient and a remedy is demanded. The solution of the problem is limited, as above described, to private enterprise or to the consideration of municipal projects whose cost shall not exceed the borough's borrowing capacity.

It is possible for Bethlehem to buy water of the Bethlehem City Water Company. It is also possible for the borough to filter Lehigh river water, its present supply, Monocacy Creek water or other surface sources. It is also possible that an additional ground water supply might be obtained. These are subjects which should receive the special study of the borough authorities and the Department of Health will be glad to review the conclusions when the borough shall have formed some definite idea of what it purposes to do. The State cannot take the initiative in working out local problems. Its province is to advise and approve plans worked out in detail by the municipality.

It has been determined that the present source of supply of water to the public in Bethlehem is prejudicial to the public health, and, therefore, the Board of Water Commissioners is apprised of the danger to the public accompanying the use of the existing source of supply, and said Water Commissioners are hereby advised and requested to prepare and submit to the State Health Department for consideration a plan or plans for the supplying of pure water to the public, which plans should be submitted on or before September first, one thousand nine hundred and seven. Also that on or before September first, one thousand nine hundred and seven, the borough shall comply with the law requiring the filing with the Department of plans and a report relative to its existing system of water works.

Harrisburg, Pa., May 27th, 1907.

BRADFORD, McKEAN COUNTY.

This application was made by the city of Bradford, McKean county, and is for permission to extend and improve its water works system by the construction of a distributing reservoir with necessary connections.

It appears that plans for the proposed reservoir were submitted to and approved by the Commissioner of Health on April twenty-ninth, nineteen hundred and seven under the following conditions:

"The Department understands that the source of supply is unpolluted and that no precautionary measures are necessary to protect the supply from pollution. Approval of the plans, therefore, is given conditionally that if upon an examination by the State Department it subsequently appears that precautionary measures should be taken with respect to the system and the facilities by which the water is delivered to the consumers, then such remedial measures shall be adopted as the State Department of Health may approve. After an examination by the State a formal approval will be issued relative to the entire system."

Investigations were made and it appears that Bradford is a city of the third class, having a population of fifteen thousand and twenty-nine in nineteen hundred and now estimated to be over seventeen thousand, located in the northern central part of McKean county about three miles from the State line in the valley of Tunungawant Creek. The east branch of this stream which is the larger rises in Lafayette township, and flows down in a northerly direction a distance of twelve miles adjoining the west branch in the central part of Bradford city; whence the main stream continues in a northerly direction and empties into the Allegheny River in the State of New York at a point about six miles north of the Pennsylvania line. The west branch rises in the edge of Lafayette township and takes a northeasterly course through Bradford township to the city, traversing a distance of about seven miles.

In the forks on the flats is built the business section of Bradford. On the lowlands abutting the main stream the industries are located comprising among others wooden ware manufacture, terra-cotta and brick works, a silk mill, foundries and machine shops. The Erie Railroad and the main line of the Buffalo, Rochester and Pittsburg Railroad passes up the valley of the east branch and local railroad lines exist in the valley of the west branch and its tributaries.

In the city and country round about oil wells are in operation and the field is a productive one though old.

A combined sewer system has its outlet into the main stream in the lower part of the city.

It is reported that the city water works system is self supporting and that the city indebtedness does not exceed fifty-five thousand dollars. Also that the assessed valuation of property is upwards of five million dollars which, if so, leaves the city well off financially since its borrowing capacity inside of the constitutional limit is in the neighborhood of three hundred thousand dollars.

According to information at hand, with the exception of possibly six hundred and fifty people who obtain drinking water from wells and springs, the entire population of Bradford city obtain their supply of water from the public system. The plant comprises at present about twenty-two miles of street mains, two impounding reservoirs, one distributing reservoir, drilled wells, pumping station and two lines of gravity supply mains to the town.

The surface supplies are derived from Gilbert and Marilla Brooks. The reservoirs on them being located about five miles west of Bradford city. Gilbert Brook flows into Marilla Brook and the latter is a tributary of the west branch of Tunungawant Creek.

The ground supply is derived from six drilled wells located in the valley of Marilla Brook immediately below reservoir No. 3 on said brook. The average depth of these wells is one hundred and fifty feet, the customary precautions were taken to prevent surface contamination, and the water drawn from the water bearing strata of red sand rock while harder than the surface supply, is reported to be satisfactory. It is pumped into a small intake reservoir constructed by means of a dam across Marilla Brook to serve the purpose

of a point of distribution of the water to the town. A fourteen inch gravity main begins here and extends to the city. The ground water supply has not been used, so it is reported, except during dry times.

The surface supply comes from a well timbered rolling uninhabited water shed, and the city owns and controls about all of it, including the territory from which the ground supplies appear to be derived. The city's possessions aggregate about eight thousand acres.

Reservoir No. one is a small earth structure, capacity four and a half million gallons, is two hundred and thirty-six feet above the elevation of the city and is located to the side of Marilla Brook and serves the purpose of a distributing basin.

Reservoir No. three is located on the brook about one-half mile above reservoir No. one and is formed by the erection of a dam across the stream which impounds one hundred and twenty million gallons. The high water mark is three hundred and six feet above the city of Bradford. The ground supply distributing basin is between reservoir No. one and No. three, and the fourteen-inch gravity main from it also delivers water from reservoirs No. one and three to the city, the connecting pipe to No. three being sixteen inches in diameter.

Gilbert Brook comes down from the north and joins Marilla Brook about half a mile below reservoir No. one. Across Gilbert Brook, three thousand feet above its mouth there is a dam constructed which forms reservoir number two, and impounds thirty-five million gallons. The high water mark of this basin is two hundred and thirty-six feet above the city. An independent supply main twelve inches in diameter extends down the valley to the fourteen-inch pipe from the other supplies where it is connected by a valve and from whence the two lines of pipe parallel each other in same trench to the city.

The sites of both impounding reservoirs were stripped of soil and organic matter, have reasonably steep side slopes and small percentage of shallow flowage. The earthen dams seem to have been substantially constructed and are efficiently maintained.

There are six and two-thirds square miles of water shed above dam number two and five and one-quarter square miles above dam number three. The railroads in each water shed are abandoned so that there is no source of pollution of a permanent character to menace the supply. The city maintains a patrolman who devotes his entire time to care of the reservoirs and the water shed. Notices against trespassing have been posted and a vigilent water is maintained to prevent accidental contamination.

During night times the normal pressure in Bradford is about eighty-eight pounds, but this fluctuates during periods of greatest consumption to as low as forty pounds, so it is reported. The average daily consumption is about one million eight thousand gallons daily, which increases to a maximum of three and eight-tenth millions. So it appears that the rate is about ninety-six gallons per capita. The domestic consumption is unmetered but meters are put on the industrial connections.

During August, September and October of nineteen hundred and six the surface supplies augmented by the ground supply was insufficient to meet the demands on the systems so that the reserve stored in the reservoirs had to be drawn upon and was nearly exhausted. It was only by restricted use of water in the city that a water famine was averted.

The proposed distributing reservoir is to be an open concrete structure, capacity three and a half million gallons located on a side hill in the northwestern corner of the city at an elevation of two hundred and five feet above the city and hence thirty-two feet below the elevation of reservoir number two and one hundred and one feet below the elevation of reservoir number three. The object of the improvement is to secure a better pressure in the city mains and to furnish a steady water supply to those portions of the city which sometimes at present are without water. If the reservoir therefore, does not improve the domestic supply and afford better fire protection there will be dissatisfaction.

The State's advice was not asked with respect to the advisability of constructing the reservoir at its present site.

The basin is to have vertical concrete sides and be three hundred and fourteen feet long by one hundred feet wide and have a depth of seventeen feet to the top of the wall. The depth of water at the overflow line will be fifteen feet. A division wall carried up to within a foot and a half of the flow line, extends across the basin half way from the end walls, dividing it into two equal compartments. The gate house is placed outside of the basin opposite one end of the division wall. It too is divided into two compartments, one containing the piping and valves for the admittance of water to the reservoir, together with the main drain and overflow and the other compartment containing pipes and valves for the distribution of the water to the town.

The water is to be delivered to the inlet chamber through a fourteen-inch cast iron main from reservoir number three about five miles distant. From this inlet compartment the water will then flow through a twelve-inch cast iron pipe into either one of the two divisions of the distributing reservoir and be delivered at the bottom near the center.

The water will leave the reservoir at the bottom through eighteen-inch pipes having screens on them and located at the gate house. These pipes are connected up with a twenty-four-inch cast iron main leading to the city.

The drainage of either compartment of the reservoir will be effected through the twelve-inch cast iron pipes which are otherwise used for the inlets. There is a twelve-inch drain extending from the inlet chamber of the gate house to Winter street and connected with this drain is a vertical twelve-inch overflow pipe which will automatically prevent water from reaching a higher elevation in the reservoir than that intended.

As above stated, the water is to flow from the outlet chamber through a twenty-four inch gravity main to the city. There will be about one-half mile of pipe of this diameter added to the street system and about an equal amount of fourteen-inch supply main to the reservoir from the existing fourteen-inch main at Barbour street.

It is proposed to deliver water through the city mains to the consumers simultaneously from the new distributing reservoir and from the twelve-inch and fourteen-inch gravity mains from the original source of supply, all being connected to the city mains at the same time and constantly, in which event the advantage of the new distributing reservoir will be that chiefly of storage in the town. This will help equalize the pressure as anticipated and supply water in those districts which now go dry in times of greatest consumption. However, the degree of relief afforded will depend upon the abundance of the supply at the source.

The quantity of water from the impounding reservoir and the driven wells is not now sufficient to meet all demands in extreme dry periods, and the distance of these sources from the town, together with the small diameters of the two supply mains offers frictional resistance which reduces the quantity of water which can be delivered to the high districts in the town to an insufficient amount for short intervals even when there is an abundance of water at the source.

While the new distributing reservoir will partly counteract the latter trouble, yet because the reservoir is but little lower than the impounding basins of the source, under the most favorable conditions where the town is to be cut off and were the two supply mains to deliver their full capacity into the new distributing reservoir, such delivery would be a quantity less than the maximum daily consumption of water in the city and very much less when the conditions at the source were unfavorable.

Therefore, it is apparent with the sources inadequate to supply the town always and gravity mains inadequate to deliver water fast enough to furnish all portions of the city constantly that the distributing reservoir is not the only immediate improvement demanded to the water works system. A larger gravity main from the source to the new reservoir and the town is needed provided enough water can be gathered from the existing sources to warrant the expenditure. Otherwise a new source of supply should be sought and obtained to be used in conjunction with the distributing reservoir under consideration.

It is reported that the Water Commission has given some thought to the advisabilty of seeking an additional source of supply on Lewis Run, a tributary of the east branch of the Tunungawant Creek. This stream is about ten miles south of Bradford City and were its waters impounded, they could be delivered by gravity probably to the new distributing reservoir in town so that this structure which is estimated to cost sixty thousand dollars should be a valuable adjunct to the system of water works whatever tthe city may determine to do about an additional supply,

Since an abundant supply of pure wholesome water is one of the prime requisites of public health, and the city of Bradford is financially able to assume the expense of securing such abundant supply, it would seem desirable that the local authorities should take immediate steps to safeguard the interests of all concerned by establishing adequate works for the supply of water to the public to meet existing demands and future requirements,

In view of the foregoing considerations it has been determined that the proposed improvements to the water works system will not be prejudicial to the public health and permission is herein granted for the construction of the proposed distributing reservoir under the following conditions and stipulations:

FIRST: That upon completion of the construction of the proposed distributing reservoir a full description of the same, its dimensions, valves, piping, inlets and outlets and proposed method of operation shall be prepared by the city and filed with the Commissioner of Health together with plans of any changes or alterations at variance with the plans already filed in the State Department of Health by the city.

SECOND: On or before January first, nineteen hundred and eight, the city shall prepare and file with the State Department of Health plans and profiles of the gravity supply mains to the town, showing, among other things, the blow-offs and facilities for draining these pipes and the location of all gates and valves on them, together with a plan of the street mains, showing the precise location and dimensions of all facilities for the blowing off or drainage of the system of street mains,

THIRD: The city may extend the street mains from time to time as necessity may require, but at the close of each season's work a plan shall be prepared and filed with the State Department of Health showing such extensions made during the year, together with any other information in connection therewith which may be required by the Commissioner of Health,

FOURTH: If at any time in the opinion of the Commissioner of Health, the source of public water supply has become unsuitable for such purposes, then such remedial measures shall be adopted as the State Department of Health may suggest or approve, and the city shall make out such reports of the inspections of its sources of supply and the operation of the water works system as may be required by the Commissioner of Health on blank forms to be furnished by the Department,

FIFTH: That before adopting any additional source of supply the local authorities shall consult with the State Department of Health and submit plans and a report for approval,

Harrisburg, Pa., June 19, 1907.

CAMBRIDGE SPRINGS, CRAWFORD COUNTY.

This application was made by the Borough of Cambridge Springs, Crawford County, and is for permission to construct a filtration plant in connection with its water works for the supply of water to the public within said borough.

The borough of Cambridge Springs, Crawford County, Pennsylvania, is located on the banks of French Creek about ten miles north of Meadville, the county seat. It has a winter population of about eighteen hundred, but the summer population increases to possibly five thousand. Mineral springs in the borough and vicinity having become extensively advertised, attract summer guests who come to the resort to be rejuvinated, and to enjoy the pleasures afforded by the popularity of the place and the accomodations of the various first class hotels there.

The borough has a municipal water supply system and public sewerage. The sewers empty into French Creek both above and below the point out of which water is drawn from said creek to supply the borough. Because the creek is polluted by the town's sewage the creek water is a dangerous source of public supply. Since typhoid fever has been normal in the community, it is necessary to observe that while possibly seventy per cent. of the citizens of the town are supplied by the public water there are numerous driven wells in the borough on private properties scattered all over the town from which most of the drinking water is derived. It is reported that the citizens apprehend danger in drinking the public supply, and it is safe to assume that very little of it is used except for meaner domestic purposes.

The borough applied for State approval of extensions of its sewer system and the question was carefully considered as to whether public health demanded that the sewage pollution of the borough's water supply should be increased. The Governor, Attorney General and Commissioner of Health reached a unanimous opinion that in justice to the water takers, the community at large and the interests of the public health in general, three things were demanded; first, that the water supply be filtered, second that pollution of this supply by sewage should be stopped, and third, that the sewage of the borough should be intercepted and conveyed to some point below the water works intake and there should be purified before the liquid be discharged into French Creek.

French Creek drains an area of five hundred and seventy square miles above Cambridge Springs. Its flow fluctuates widely and so does the quality of the water. The population in boroughs and villages on French Creek above Cambridge Springs within a radius of thirty miles, was in nineteen hundred, forty-eight thousand and fifty-eight. The possibility of pathogenic pollution arriving in the creek at Cambridge Springs is always present and the repetition of the Butler epidemic of Nineteen hundred and three and four is easily possible at Cambridge Springs. provided the people drink the town water. So even if the borough were to remove its own sewage to below the water works intake, there would still be danger, making necessary the filtration of the supply.

In response to the advice of the Commissioner of Health, the petitioners desire to install a mechanical filtration plant.

The public supply is taken from French Creek in the central part of the borough and pumped without any attempt at purification directly to a wooden stand pipe, holding about one hundred and twenty-five thousand gallons, located on a hill from which the water flows back through the borough.

The pumping station is situated on low ground north of French Creek in the borough and is sometimes flooded during freshets. Five wells were drilled in the vicinity of the pump house several years ago and the water therefrom was supplied to the stand pipe and village; but it became unpalatable and in consequence the borough authorities decided to abandon the well water and did so. At the present time the water supply is taken wholly from French Creek.

The pumping station contains an intake well, two triplex pumps, a steam engine, one gas engine and a boiler plant. Each pumping engine has a capacity of about four hundred thousand gallons daily. The average water con-

sumption is from sixty thousand to one hundred thousand gallons daily, a very small amount for a borough the size of Cambridge Springs. Were the water supply to the public satisfactory to the people, undoubtedly the consumption would increase to ultimately about four hundred thousand gallons daily during the summer time. It is becoming the universal experience of water companies that the way to rehabilitate a non-paying proposition is often by purifying the water whereby the consumption is largely increased and the revenues proportionately. Undoubtedly the improvement of the water supply of Cambridge Springs will materially increase the consumption and hence the revenues.

The proposed improvements comprise a concrete coagulating basin, approximately forty-eight feet long by eight feet wide and eight feet deep, two reinforced concrete filter units, each ten by twelve feet wide, located side by side, each with a capacity of three hundred and thirty thousand gallons per twenty-four hours, allowing the customary rate of three hundred and sixty square feet per one million gallons of water filtered, together with all necessary pipe, valves, controllers and appurtenances for operating and regulating the flow of water through the coagulating basin, filters and clear water well. However, it is not intended to equip but one filter unit at the present time. Also a clear water well to be constructed out of the existing pump well and all to be housed within a brick or concrete block superstructure with roof covered with slate and joined to and made a part of the present pumping station.

The plant is to be installed by a contractor, who upon completion of the work shall place the plant in charge of an expert for a ten days' operation test, during which the borough may have the water analysed to determine the degrees of purity obtained by the plant, which purification shall be such that in no case shall the average number of bacteria in the filtrate exceed one hundred per cubic centimeter, except when the number of bacteria in the applied water shall exceed three thousand per cubic centimeter, in which event the average reduction of bacteria in the filtrate shall be at least ninety-seven per cent.

The specifications required that not more than five per cent. of the individual samples of the filtrate shall show more than one hundred and fifty bacteria per cubic centimeter, or as efficiency as low as ninety-seven per cent. No trace of undecomposed coagulent shall be left in the filtrate, nor shall the filtrate show an increase in iron or alumina. But the water shall be clear, bright and practically free from color, turbidity and matter in suspension and shall be supplied at the rate of two hundred and forty thousand gallons per twenty-four hours when the filters are operated at the normal capacity.

It is the intention and purpose of the borough to have placed in one filter only, the apparatus necessary for operation. It consists of a wash and collecting system of heavy cast iron manifold sections into each side of which and extending to the side walls of the filters, shall be tributary pipes. These laterals are to have screwed into them the latest improved bronze metal screens. On this collecting and wash system is to be placed eight inches of gravel whose diameter shall range between three-sixteenths and ten-sixteenths inches and on top about thirty inches of specially selected and screened filter sand to have an effective size of not less than thirty-five hundredths milimeters nor more than fifty-six hundredths milimeters with a uniformity coefficient of one and seventy hundredths.

The filter is to be equipped with two overflow troughs for distributing the incoming raw water and remove evenly from all parts of the bed the soiled wash water. As near as can be ascertained the top of the troughs will be at least one foot above the surface of the sand bed.

Raw water is to be delivered from the creek through one of the existing pumps which is to be disconnected from the other pump which it to be used for raising the filtered water into the town. This second pump, according to the plan is to be given connection with the suction pipe to the creek, to be used only in emergencies, probably in case of fire.

A tank for dissolving the chemicals to be used in coagulation and for introducing the solutions in proper amounts in the raw water is to be provided and a constant head office box and a finely graduated adjusted orifice for feeding the solution at the proper rate to the raw water, is also called for.

The coagulating basin is to hold about twenty-three thousand gallons and is to be built of re-inforced concrete and covered over, except near its outlet end. There are to be two baffle walls, so as to insure complete mixing and there are two sumps in it connecting with a drain which will lead to French Creek. The location of the point of drainage into the creek is not shown. Presumably this drain will also take the wash water.

The outlet from the coagulant basin is to be at the surface over a wier plate from whence the chemically treated water will pass into the troughs at the filter. The filtrate from the filter is to go to the present intake well which is fifteen feet in diameter and about thirty feet deep. This well is to be filled up with concrete and may be twenty-five feet deep, thoroughly repaired and to receive a water tight coating on the interior. The outside of the well is to be plastered up and made tight and the whole will be covered over with a

cement floor. The capacity will be twenty-six thousand gallons after the reconstruction. The second pump will take the water from this well and raise it to the stand pipe on the hill from whence it will be distributed to the town.

It is intended that the washing of the filters shall be accomplished by water directly from the standpipe main. Also a blower is to be installed and the filter agitated with air at the time of cleaning for the purpose of loosening and scouring the sand free from adherent impurities.

If it be true that the water consumption is never over one hundred and twenty-five thousand gallons, the proposed filter plant will be amply adequate for all domestic uses except during the time of fire when it is altogether probable that raw creek water would have to be used. Such use after the people were resting in the sense of security afforded by the filtration plant might be attendant with a serious epidemic. Such was the case at Butler. If the popular suspicion of the public supply be removed, by plans approved by the State, these plans must be comprehensive enough to prevent the pollution of such supply at any time, hence the capacity of the improvements must be equal to greatest demand on the system. Two filter units are necessary for this purpose. The storage of filtered water is to be effected practically wholly in the standpipe on the hill which holds about one hundred and twenty-five thousand gallons. It is only intended to run the plant a few hours daily, so a fire may occur when the water is low in the tank on the hill and the demand on the system come wholly upin the speeding up of the the filters. The maximum rate of these two filter units is in the vicinity of six hundred and sixty thousand gallons, and if at this rate the creek water happened to be very turbid, unless ample preliminary treatment by the chemicals were accomplished, the filters might clog up in a short time before the fire ceased and then necessitate the introduction of raw creek water into the system, it is thought advisable that the coagulating basin should have a capacity of at least double that now provided. Such capacity can be economically provided by duplicating the basin now proposed.

As an added security the local authorities should not permit the water in the tank on the hill to fluctuate more than a normal amount.

Facilities should be afforded for at least four fire streams whose maintenance would call for a rate of not less than sixty thousand gallons per hour.

Economy dictates that this rate be met by stored filtered water rather than by additional filter units. Furthermore, the present pumping capacity is needed for the supply of filtered water to the town. The arrangement as proposed is unsatisfactory. If either pump broke down, crude creek water would have to be supplied to the consumers probably. The plant needs to be improved by the installation of duplicate centrifugal pumps of low lift, by means of which the creek water shall be raised into the purification plant. Preferably the present pump well should be continued in use for this existing purpose. Then existing pumps should be maintained for raising the filtered water to the standpipe on the hill or to meet fire emergencies.

A new filtered water basin of about 250,000 gallons capacity should be constructed outside of the station and approved means of controlling the rate of filtration should be provided.

To do these things means possibly an expenditure of fifteen thousand dollars. The Department is informed that the borough cannot legally raise this amount of money by a bond issue but it can raise money enough to equip both filter units.

It is reported that the valuation placed on property in Cambridge Springs is exceptionally low and that without injustice to anybody and in the interests of the public welfare the valuation should be increased. If this were done, the borrowing capacity of the borough would be extended sufficiently to admit of proper improvements to the existing water works plant.

Because crude creek water is supplied all of the time now to the public, there is less danger than would be the case after a filter were installed to purify the creek water most of the time but not all of the time, for reasons previously stated. But, of course, the plant proposed will render the public supply more desirable during a considerable portion of the time and if approval be given to the plans under conditions that will assure its enlargement as fast as the borough shall obtain funds to meet the expenditures, and, meantime, the public be given to understand that in case of fire or other abnormal use of the town supply only boiled water shall be used for domestic purposes, a step in the right direction may have been taken.

The borough may be permitted to install one filter and to operate as now intended in conjunction with a covered clear filtered water basin to be built independent of the pump well and in such a manner that it may be increased in capacity when the other parts of the filter plant are added to the layout, as a temporary expedient if this be done in line with a plan to equip the water works system thoroughly and efficiently as generally suggested hereinbefore. So the comprehensive plan should be prepared now and submitted for approval, but this need not deter the local authorities making a contract for the construction of the proposed filters.

31—16—1907

In view of these considerations, I have determined that the proposed additional source of supply, and the construction of a filtration plant as proposed for the purification of the water will not be prejudicial to the public health under certain conditions, and I do hereby and herein grant a permit therefor under the following conditions and stipulations:

FIRST: That on or before the date of operation of the filter unit herein approved, the borough shall prepare comprehensive plans for a water purification plant, comprising independent duplicate pumps for raising the raw river water to the plant, a coagulating basin or basins at least double the capacity now proposed, two filter units, a clear water basin independent of the pump well and duplicate supply pumps to the town, together with all appliances and appurtenances and submit the same to the State Department of Health for approval. And with the exception of the converting of the present pump well into a filtered water basin, which is disapproved, the proposed plans are approved and the further additions to the plant called for may be made additions to said proposed plans.

SECOND: The borough authorities shall notify the water consumers that raw creek water may be introduced into the water works system and that during fires and for sometime thereafter, until the street pipe system be thoroughly flushed and drained, the danger of infection may be greatest. Hence absolute safety only is assured when the consumer boils the water.

THIRD: After each fire the borough shall thoroughly drain the entire water works system of all raw creek water if any has been introduced into the system. And weekly reports of the operation of the plant shall be filed with the Commissioner of Health on blank forms furnished by the Department.

FOURTH: If at any time, in the opinion of the Commissioner of Health, the water works system or any part thereof, or the quality of water, has become prejudicial to the public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may advise or approve.

FIFTH: Approval of the proposed plans, excepting the clear water basin, is given as a means to an end and it is expressly stipulated that in accepting this permit the borough obligates itself to complete the construction of the comprehensive plans to be prepared by the borough and modified, amended or approved by the Commissioner of Health at as early a date as shall be found practicable, or when ordered by the Commissioner of Health.

SIXTH: The emergency connection from the filtered water pump suction to the raw creek water shall not be used and raw creek water be introduced into the system except during a fire or some equally important emergency. The borough shall promptly notify the Commissioner of Health whenever this connection is used or raw creek water is supplied to the consumer. This relates to the proposed plan, but when the comprehensive plant shall have been built, no connection whatever between the filtered water pumps and the creek pumps will be permitted.

SEVENTH: A complete set of plans of the purification plant and the pumping station layout proposed to be constructed shall be prepared by the borough and filed with the Commissioner of Health upon completion of the work. And a complete report of the test of the filter plant before it is accepted by the borough shall be made to the Commissioner of Health.

EIGHTH: An approved rate controller shall be fitted to the proposed filter whereby the rate of filtration may be regulated as desired. From time to time the State Department of Health will make tests of the water and borough shall assist. If found desirable or necessary, the Commissioner of Health may prescribe standards of efficiency and make regulations for the operation and maintenance of the plant.

Harrisburg, Pa., August 15th, 1907.

CAMBRIDGE SPRINGS, CRAWFORD COUNTY.

This application was made by the borough of Cambridge Springs, Crawford county, and is for a modification of a permit dated August fifteenth, one thousand nine hundred and seven, and issued to said borough for the construction of a filtration plant in connection with its water works for the supply of water to the public within said borough. It appears that in clauses one and five of said permit of August fifteenth, one thousand nine hundred and seven, reference was made to the existing pump well. Said clauses are as follows:

"FIRST: That on or before the date of operation of the filter unit herein approved, the borough shall prepare comprehensive plans for a water purification plant, comprising independent duplicate pumps for raising the raw river water to the plant, a coagulating basin or basins at least double the capacity now proposed, two filter units, a clear water basin independent of the pump well and duplicate supply pumps to the town, together with all appliances and appurtenances and submit the same to the State Department of Health for approval. And with the exception of the converting of the present pump well into a filtered water basin, which is disapproved, the proposed plans are approved and the further additions to the plant called for may be made additions to said proposed plans.

"FIFTH: Approval of the proposed plans, excepting the clear water basin, is given as a means to an end and it is expressly stipulated that in accepting this permit the borough obligates itself to complete the construction of the comprehensive plans to be prepared by the borough and modified, amended or approved by the Commissioner of Health at as early a date as shall be found practicable, or when ordered by the Commissioner of Health."

On behalf of the borough authorities, the Pittsburgh Filter Manufacturing Company, whose plans for the erection of the water filtration plant were adopted by the said borough and approved under certain conditions and stipulations by the Commissioner of Health in said permit, now represents that the finances of the borough will not permit the construction at this time of a clear water basin outside of the station and independent of the old pump well within the station. Further, it is represented that if the borough be permitted to use the old pump well temporarily as a filtered water basin, as soon as moneys can be obtained therefor the borough will construct the outside and larger clear water basin in compliance with the terms of said permit of August fifteenth, one thousand nine hundred and seven; but if approval be withheld to such temporary use of the old pump well with proposed improvements, then the borough will be unable at this time to install any filtration plant and the safeguarding of the public health will, therefore, be postponed.

It has been determined that the temporary use of the pump well as intended will not be prejudicial to the public health, and a permit therefor is hereby and herein granted, under the condition and stipulation that this permit shall operate as a modification of the permit of August fifteenth, one thousand nine hundred and seven, only as far as relates to said pump well, and that all other terms and conditions of said permit of August fifteenth, one thousand nine hundred and seven, shall stand and remain in full force.

Harrisburg, Pa., October 2, 1907.

CHAMBERSBURG, FRANKLIN COUNTY.

This application was made by the borough of Chambersburg, Franklin county and is for permission to increase its source of supply to the public and to extend and improve its water works system.

It appears that the borough of Chambersburg, county seat of Franklin county, is situated in the central part of said county in the Cumberland Valley, on the east branch of the Conococheague Creek near its head waters and the divide between the Susquehanna and Potomac River basins. The town has a population of about ten thousand, is the trading point for the surrounding farming country and also possesses important manufactories.

The geological formation of the borough site is limestone. The rock is so near the surface that some of the trenches for water pipe were excavated in the limestone. It is the common custom to dispose of household drainage and sewage into crevices in the rock. This pollutes the soil and renders well water absolutely dangerous. So far as the Department is informed, the custom of obtaining drinking water from private wells in the borough has been abandoned. About everybody takes water from the public system which is owned and operated by the municipality. There are no public sewers in Chambersburg. A few private sewers exist with outlets into the Conococheague Creek, or its tributaries, within the borough limits.

The water works system was installed in the year eighteen hundred and seventy-six. It now comprises an intake dam and pumping plant, force main, two distributing reservoirs, gravity supply mains and street pipe system.

The source of supply is the east branch of the Conococheague Creek, from which water is taken at a point two miles above Chambersburg. Above the pumping station there is a drainage area of one hundred and six square miles, the lower half of which is farm land of limestone formation, the upper or eastern half being wooded, mountainous country of rock porphyry formation, in which is located a part of the State Forestry Reservation. The Cumberland Valley Railroad and its branches, and the Western Maryland Railroad traverse the water-shed, along their lines are numerous stations, and all told, the water-shed contains a population of about five thousand people. At Conococheague Island, about six miles above the pumping station and intake, there is a colored camp-meeting ground, used for about two weeks each summer, whereon the largest day possibly two thousand people congregate. Scotland Village, in Greene township, population two hundred and fifty, is on the creek four and a half miles above the water works intake. The stream has a rapid descent and the run-off is correspondingly sudden, so that pathogenic pollution from any one of the numerous permanent sources could be transported to the water works intake in a short time and gain admittance to the system in a condition capable of producing disease in Chambersburg.

Across the creek at the old pump house, a dam about six feet high has been constructed to serve intake purposes. The stream here taken a half-circle course to the westward, the dam being at the up-stream end of the turn and the pump house at the down-stream end of the semi-circle, the two points being connected by a race forming an island. In the pump house there is located two pumping engines, one being operated by steam and the other by

water power. The steam engine has a capacity of one million five hundred thousand gallons daily and the other engine a capacity of about two million gallons daily. Up to the present time, water has been taken from a small intake chamber fitted with a screen on the banks of the race through a twelve inch suction pipe to the steam pump, and directly from the race through a ten inch suction to the power pump and thence through a force main twelve inches in diameter, length about one-half mile, to a two million gallon distributing reservoir elevated about one hundred and sixteen feet above the pumps, and located on a hill north of the borough partly in Greene and partly in Hamilton townships, from whence water is supplied by gravity through a twelve inch main to the town and to a smaller distributing reservoir located in the western part of Chambersburg and about seven feet lower than the main reservoir. Its capacity is reported to be one million gallons.

The larger reservoir is paved with brick on the sides and bottom and it is enclosed by a board fence four feet high. There is nothing to prevent anyone maliciously inclined from casting pollution into the water in the basin. The inlet pipe is at one corner, enters at an upward incline and throws the water some distance above the surface of the high water mark, effecting aeration to a small degree. The outlet pipe is at the further side about five feet from the bottom of the basin and about ten feet below the surface of the water and is covered by a strainer. Facilities for drainage are afforded. All valves are outside of the reservoir. Detail plans have not been submitted. The conditions at the smaller reservoir are similar.

There are reported to be fifteen miles of distributing mains, of which one and three-tenths miles are ten inches in diameter, three-tenths of a mile is eight inches, two and a half miles are six inches, ten and six-tenths miles are four inches, one-tenth of a mile is three inches and two-tenths of a mile is two inches in diameter. The large percentage of four inch pipe would indicate that the fire pressure service in the town is unsatisfactory. There are many dead ends in the system.

A plan of the distributing system showing sizes of water pipe, locations of hydrants and valves, has been filed in the Department of Health, but information has not been submitted showing clearly the facilities for draining every part of the street pipe system.

It is reported that the average daily consumption for all purposes is one and a half million gallons, and that the maximum is less than two million gallons.

The petitoners represent that the present pumps are in need of repairs and a thorough over-hauling, and that since the combined storage capacity of the reservoirs is only sufficient for a two days' supply under average conditions, that the town is compelled to install a new pumping engine of two million gallons daily capacity to insure a satisfactory service.

It is proposed to erect the new pumping engine in a new pump house on the island and not far distant from the old pump house and to use the main source of supply. On this island there is a settling basin formed by excavation, into which the race water is to be conducted by percolation through an earth channel filled with gravel, or at choice, through a pipe connecting the race with the said settling basin. The suction pipe of the new engine is to extend out into this open pump well, and the discharge pipe is to be connected up with the existing force main.

At Scotland Village one of the State Orphan Schools is located. The buildings are of modern construction, are supplied with water from springs located on the banks of the creek, and are drained by a separate system of sewerage, the sewage being disposed of by the Waring system of surface irrigation. There is a receiving tank, thirty thousand gallons capacity, which discharges, when full, by syphon through broken stone strainers into a ten inch pipe to the disposal field containing about two acres, over the surface of which the sewage is distributed by gravity. The field is located about two hundred feet from the creek and is said to receive about two tanks discharges every twenty-four hours. There is an over-flow from the syphon tank, which may also be used as a by-pass, by means of which the institution's sewage may be conducted directly into a storm drain on the property and through it to the creek. In cold weather when the field becomes frozen, it would be strange indeed if some sewage did not reach the stream almost as soon as discharged onto the field. Ordinarily, especially in dry weather, it appears to soak away in the ground or pass off by subterranean channels. The disposal area is level and thirty feet above the creek, and judging from numerous outcrops in the vicinity, is entirely underlaid with limestone formation. The topographical evidence is entirely favorable to the conclusion that the sewage to a greater or less extent from the institution must reach the Conococheague Creek in a condition to menace Chambersburg's source of supply.

In case of a typhoid outbreak in the school, its own water supply might thereby become infected because the springs from which the water is pumped are about six hundred feet farther down stream below the disposal area and the storm drain and sewer pass in close proximity to one of the springs. Whether there is any underground indirect connection between the crevices in the limestone rock under the disposal field and the stratum supplying the water to the spring, is not known. However, should vast quantities of water be pumped out of these springs, it would pull on the underground storage for long

distances and then direct connection would undoubtedly be developed between the disposal area and the springs. It is reported that not a single case of typhoid fever has occurred since the buildings were erected about the year eighteen hundred and ninety-three. It is evident, however, that the springs are a suspicious source of supply of drinking water to the institution, so long as the present method of sewage disposal there prevails. Furthermore, this disposal should be condemned in the interests of the public health generally.

A water-shed occupied by railroads, whose coaches are fitted with toilet facilities, from which infection may at any time be discharged into the streams supplying Chambersburg with water, and also having upon it villages, camp grounds and sewage disposal plants, from whose remotest part waters can reach the intake of a pumping station in a few hours, is not a safe or suitable source for a public supply, unless the waters be first adequately filtered. While the State can minimize the menaces and will do so, these precautions will not be sufficient to wholly safe-guard the interests of the public health and it is clearly the duty of the local authorities to instal a water filtration plant at once.

The borough has given some consideration to the obtaining of a gravity supply of pure mountain water. Such a supply is desirable, but it also appears that the interest of all concerned demand the immediate installation of a public sewerage system in the borough. If it be true that Chambersburg's borrowing capacity at present is not in excess of one hundred thousand dollars, or thereabouts, then it would appear to be impossible for the municipality to secure both improvements, namely, the mountain supply of pure water and the public sewerage system. While much of the cost of the latter can be assessed on the abutting estates, according to a uniform rate of assessment that shall obtain over the whole borough, yet the trunk sewers and the sewage disposal works, and some other general expenses must of necessity by defrayed by general taxation. It is believed that this sum deducted from the borough's borrowing capacity leaves an amount barely sufficient to pay for the cost of the installation of a modern water filtration plant capable of treating two million gallons of water daily, and totally insufficient to carry out the project of the gravity mountain supply.

It has been determined that the proposed increase of the water supply to the public in Chambersburg, by means of the installation of additional pumping machinery according to the plans submitted, will not be prejudicial to the public health under certain conditions, and a permit is hereby and herein granted therefor, under the following conditions and stipulations:

FIRST: That detail plans of the layout of the new and old pump house, pumping engine, piping valves, intakes, settling basin, etc., together with a plan and profile of the force main, shall be prepared and filed by the borough with the State Department of Health on or before September first, one thousand nine hundred and seven.

SECOND: Detail plans and sections of the distributing reservoirs, showing all piping, valves, etc., together with a satisfactory report as to the facilities afforded in the street pipe system for adequate drainage thereof, shall be prepared and filed by the borough with the State Department of Health on or before September first, one thousand nine hundred and seven.

THIRD: The borough may extend its street mains and enlarge existing ones from time to time as necessity may require. At the close of each season's work, plans of the improvements made to the system during the year shall be prepared and filed by the borough with the State Department of Health.

Fourth: On or before September first, one thousand nine hundred and seven, the borough shall submit plans and specifications for a plant to treat the Conococheague Creek water to render it safe for drinking purposes, or plans and specifications for the obtaining at once of a source of supply not prejudicial to the public health, and meantime, the proper local authorities shall notify the public to boil all water used for drinking or culinary purposes. People should be warned of the danger respecting the use of the Conococheague water in its raw condition. If the warning be not heeded, then in the event of an epidemic of a water-borne disease, the responsibility will rest on other shoulders than those of the public officials.

FIFTH: If at any time the water works system herein approved, or any part thereof, shall have become prejudicial to the public health, in the opinion of the Commissioner of Health, then such remedial measures shall be adopted, not herein otherwise provided for, as the Commissioner of Health may approve or suggest.

The attention of the borough authorities is called to the responsibility resting upon the municipal corporation to furnish a pure and wholesome water to the public. Also to the fact that because of advancement in the art of sanitary engineering, it is now practicable at reasonable cost to filter water and furnish it to consumers in a purer state than it may be possible to obtain it from its source and that the courts of Pennsylvania are beginning to take cognizance of this fact as evidenced in a recent decision. Again, because Chambersburg has not been stricken with an epidemic, is no proof that an explosion may not occur to-morrow. The Scranton epidemic of the winter of one thousand nine hundred and six, and seven, well illustrates this fact. The conditions are more

favorable for an outbreak in Chambersburg or in any event as favorable as they were at Scranton. The necessity for a proper safeguard cannot be too strongly urged by those in authority at Chambersburg.

Harrisburg, Pa., June 24, 1907.

CLARION, CLARION COUNTY.

Clarion Water Company.

This application was made by the Clarion Water Company of Clarion, Clarion county, and is for permission to extend its water works for the supply of water to the public within the limits of the borough.

It appears that Clarion borough is the county seat and a trading point for the surrounding farming country. It has a glass bottle and a cigar manufactury, the former employing about one hundred and ten hands, and the latter about eighty hands. A State Normal School, having a maximum enrollment of five hundred students, is located in the town. The municipal population is estimated to be two thousand two hundred. In the year nineteen hundred, it was two thousand and four. In the year one thousand eight hundred and ninety it was two thousand one hundred and sixty-four, and in one thousand eight hundred and eighty, it was one thousand one hundred and sixty-nine. Thus it is seen that the town's growth has been moderate, and judging from this fact and present indications, there is no occasion to estimate a greater proportional growth for the future.

Clarion county is in the lower productive coal measures and the surface of the ground is generally of a rolling aspect. Interspersed throughout are deep channels which the water courses have made for themselves and these channels are usually in the underlying conglomerate measures. Clarion borough is located on the south bank of the Clarion River and about five hundred feet above it. The river here is in a narrow gorge in some places the banks being almost vertical. The streams tributary to it are short and precipitous. The site of the borough is on a bench somewhat conical in shape, the summit being one hundred and thirty feet above the main street of the town and five hundred and sixty feet above the river. On this hill the water company's distributing tank is located and also the State Normal school buildings.

The river at this point is a very considerable stream. Its drainage area comprises about nine hundred square miles in which are portions of McKean, Elk, Jefferson, Forest and Clarion counties. The waters are polluted by sewage and industrial wastes from coal mines, tanneries, chemical works and paper mills, which render the stream unsuitable as a source of public water supply.

The local authorities report that there are both public and private sewers in the town and that about three-quarters of the population use the sewers. Some of the sewers empty into the Clarion River and others on the hillsides.

About one-half of the present population obtain drinking water from wells and springs in the borough and the others purchase water from the Clarion Water Company. There is a contract between the borough and the company whereby the latter maintains a fire service. The total daily consumption averages two hundred thousand gallons, with a maximum of two hundred and fifty thousand gallons.

The Clarion Water Company was originally founded in the year one thousand eight hundred and seventy-four. It was reorganized and duly incorporated under the laws of the State in one thousand eight hundred and eighty-seven for the purpose of supplying water to Clarion borough and vicinity. It is a home corporation.

The works were first built in one thousand eight hundred and seventy-five and the source was the river. The water was pumped through a six inch main into an iron tank thirty feet in diameter and forty-five feet in height, resting on a stone and concrete foundation, located on the hill in the borough. This source was used until one thousand eight hundred and ninety-six when it became so polluted with trade wastes, principally produced in Elk county as to be unsafe for domestic purposes. The company was then compelled to seek other water, which it did by resorting to a small stream on the opposite side of the Clarion River from the borough, known as McLain Run. As early as one thousand eight hundred and ninety-three the water company petitioned the local and state board of health for an abatement of the paper mill and tannery pollutions at Ridgway, Johnsonburg and other places in Elk county.

At the present time the system comprises an impounding reservoir on McLain Run, a mechanical filter plant, pumping station, drilled wells, distributing tank and nearly six miles of street mains, ranging in sizes from two inches to ten inches in diameter, of which the four inch pipe comprise about thirty-four per cent., the six inch twenty-five per cent., the eight inch ten per cent. and the ten inch about thirteen per cent.

The reservoir is near the mouth of McLain Run, has a storage capacity of about five million gallons, and a water shed of about seven hundred and fifty acres. The stream is fed by numerous springs, outcropping on the hillsides and at its source a mile and a half north of the river. The water company owns

the land immediately surrounding the reservoir, but the balance of the water shed belongs to farmers, approximately fifty per cent. of it being cleared and under cultivation. There are seven dwellings and between thirty-five and fifty people on the area above the dam which constitute the permanent menace to the purity of the water.

The S. B. McClain's property, which is about half a mile above the reservoir, the barnyard drainage is to a tributary of the run.

A few hundred feet further up stream, at the property of Jacob McLain, there is a privy on the steep slope to the run, from which privy which is overflowing all rain water flows directly into the water supply.

Nearly a mile above the reservoir there is a public highway and hereon the east side of the run is the residence of George W. McLain, and on the west side, Frank P. McLain. At the former a pigstye extends across a tributary of the run. At the latter a pigstye, privy and kitchen slops drain towards the run and pollute the water supply.

There is a pigstye on the Fred Williams estate which also drains into a tributary of the run.

At the head of the run on the property of Isaac I. Imhoff, there is a privy on the banks of the run and a pigstye across it, and also a tenement house over a spring leading to the run, drainage from all three going to the public water supply. The privy is in specially foul condition and overflowing. This property is elevated in the neighborhood of four hundred feet above the impounding reservoir. The water shed being steep assures a rapid run-off of rain-fall and hence any pollutions thereon could be introduced in a short time into the water pipe system of Clarion.

However, it is reported that McLain's Run was a comparatively pure trout stream until about two years ago. Early in the year one thousand nine hundred and five, oil prospectors discovered valuable oil deposits and natural gas on the water-shed and since that time, the field has been developed and is now a very productive one. There are about thirty-five wells on the area draining to the impounding reservoir. Others will be added in the future.

This pre-emption of the water-shed by oil and gas interests has seriously polluted the run and temporarily crippled the water company's facilities.

The waste material produced in the operation of drilling the wells, in shooting them, and in cleaning them out, is deposited on the surface of the ground round about and eventually gets into the main stream of the water supply. Sometimes the waste will impart a light milky color to the water, resulting from sand pumpings, and again the material may be an oily and greasy waste or a black substance called burnt glycerine. The drippings from oil tanks and leaky pipes inevitably occur, so that the water of a stream passing through a highly developed oil field is bound to be polluted.

The dam is constructed partly of timber but mostly of earth and stone. It is in poor repair. An eight inch supply main, the end of which is covered by a screened box, conveys the water across the river and down stream about half a mile to the pumping station, located on a bench excavated in the hillside. The water is delivered here under a head of about one hundred and twenty-five feet. In the station are installed two gas pumping engines, each being compound duplex and having a combined capacity of a little less than two million gallons. The pump well is about eight feet square and eight feet deep and the water from the reservoir may be deliverd to it or to the filter or both at the same time. The bottom of the well is reported to be about twelve feet above the river and a twelve inch cast iron pipe extends from the bottom of the well into the river. It has a valve on it and formerly was used as the suction pipe when the river was resorted to as a temporary source. This pipe is now maintained for emergency purposes. Connection with the suction pipes of each pump can be made in a short time and it is reported that the specials are kept on hand. So raw water can be pumped to the town in an emergency or at any time if the said connection be made.

The force main is six inches in diameter and extends up the ravine of Woods Run, a distance of thirty-six hundred feet to the iron tank on the hill. The plant is operated intermittently from nine to twenty hours, depending upon the season of the year.

The filter is of the Jewell mechanical type sixteen feet in diameter, located in the station near the pump well and is used to purify the reservoir and the river water. However, no subsidence or coagulating tank is provided in connection with the filter, the alum solution, when it is used, is applied to the water on the surface of the filter, and the rates at which it must be operated if all of the water raised into the town during any particular day be filtered, are so excessively high that efficient purification should not be expected.

The reservoir water is delivered on surface by gravity. The river water is raised on to the filter by a centrifugal pump specially provided for the purpose and having independent connections with the river and the filter.

The drilled wells are nine in number. They extend along the bank of the river and are sunk in the rock and shale to a depth of seventy feet approximately and to a black gritty slate in which an abundance of water is found. Evidently the water must come from a distance laterally for it is under pressure and rises within seventeen feet of the surface of the ground.

So the height is slightly above that in the river. Six of the wells are up stream from the pumping station and three of them immediately below it. Only seven of these wells, however, have been in use. The water is raised from them by compressed air into a gravity cast iron pipe leading to the pump well at the station. The collecting main and the tops of the casing pipes and the caps are above the surface of the ground and exposed to view.

It was discovered after the river was abandoned for the McLain reservoir supply that this source was insufficient in dry weather to supply the town, so recourse had to be had to the river. The filter plant was installed about the year one thousand nine hundred and two. It is reported that prior to this date the water company had drilled one well near the pump house and that it produced salt water. About this time an oil well had ben drilled by Woods Run less than seven hundred feet distant. It has since been discovered that salt water from the oil well, which well was unproductive and never operated, was the cause of the contamination of the water well at the pumping station because after the casing of the oil well was removed and the well plugged at required by law, thereby shutting off any further flow of salt water, the water in the well at the pump house began to freshen and finally was soft and suitable for drinking purposes.

Upon this discovery or later, the other wells were drilled at the pumping station in an effort to develop a ground water supply of sufficient quantity to supply the town.

The driven well supply and McLain reservoir supply proved together to be ample. The cost of operating the wells made the reservoir supply the more profitable one for the company. Hence this water was supplied to the town as long as it lasted. The oil development of one thousand nine hundred and five on the reservoir water shed, herein before described, contaminated the run waters with a class of pollution which the filter could not remove and in consequence, there being no adequate remedy at law in this case as appeared after a preliminary injunction restraining the oil operations had been granted, that the water company was forced either to use the river or further develop the driven well supply. It is for approval of the new wells that application has been made.

Eight wells have been drilled recently along the southern bank of the river in proximity to the other wells, and abundant supply of water of the same quality as that obtained from the old wells has been produced by the new wells, and the water company desires to connect the new with the old well system and operate them all together.

Detailed plans of the McLain reservoir supply main, pumping station, filter, piping and valves and force main, and details of the driven well system, both old and new, have not been filed by the water company in the State Department of Health.

Such tests, chemical and bacteriological of the waters as have been made, show them to be suitable for drinking and manufacturing purposes.

The proposed well supply is excellent and abundant. There is ample opportunity for future extension. The danger from sewage pollution seems to be very remote if not wholly eliminated. The geological structure in the valley of the river being in the conglomerate measures, the water bearing rock, being far below the river bed and roofed over by impervious rock, in all probability collects its waters from remote points and it is altogether probable that the numerous oil and gas wells on McLain Run may penetrate the stream supplying water to the water company's driven well system. If this be the fact, it appears evident that by neglect in properly closing abandoned oil or gas wells, salt water may impregnate the town's drinking supply as it did at the one well previously described.

In the construction of an oil or gas well, the iron pipe casting is driven down through the different strata to bed rock and firmly imbedded therein. Below this it is unusual to encounter water until the oil bearing strata is reached where sometimes salt water abounds. When a well ceases to be productive of oil or gas it is the custom for the owner to draw the casing and use it elsewhere. If the well be not plugged, surface and sub-surface water will flow in and being heavier than oil, will fill up the natural oil reservoirs and force the oil back perhaps long distances. It is known to be a fact that in this manner a property in which oil abounded has been entirely robbed of this resource and the owner thereof forced to sustain a loss of thousands of dollars.

Act number one hundred and twenty-three of the year one thousand eight hundred and eighty-one, regulating the mode of plugging abandoned oil wells, related only to oil wells and was passed for the purpose of protecting oil by excluding all fresh water from the oil bearing rock.

Act number one hundred and fourteen of the year one thousand eight hundred and eighty-five, was passed to protect gas wells also. Its provisions are similar to the law of one thousand eight hundred and eighty-one. Both stipulate that upon abandonment or ceasing to operate the wells, the owner shall, before drawing the casing, fill up the well with sand or rock sediment to the depth of at least twenty feet above the gas or oil bearing rock, and drive a round, seasoned wood plug, at least two feet in length, equal in diameter to the diameter of the well below the casing, to a point at least five feet below

the bottom of the casing; and immediately after the drawing of the casing shall drive a second round, tapering wooden plug into the well. The second plug is provided as a double insurance against inflow of water. It is to be placed just below where the lower end of the casing shall have rested, and after being properly driven, sand and rock sediment to a depth of at least five feet is to be filled in on top of the plug.

Any owner of land adjacent to, or in the neighborhood of, an abandoned well, on neglect of the owner may enter and plug the well at the expense of the owner of said well.

Act number one hundred and fourteen, of the year one thousand eight hundred and ninety-one, was passed to prevent the pollution of springs, water wells and streams, by water escaping from abandoned oil wells and gas wells. The plugging provided for by law is to completely shut off and prevent the escape of all water impregnated with salts, or other substances which will render springs, water wells or streams unfit for use for domestic, steam making or manufacturing purposes.

Any person injured may plug such abandoned well and recover the expense for the same. As a protective measure, the water company should maintain a patrol of the territory liable to contribute to its driven well system whereon may be located oil or gas wells to prevent through carelessness or neglect the contamination by salt water of its ground supply.

The water company has purchased a tract of about seventy acres on which is located its pumping station and driven wells, which purchase is said to have been made to keep oil prospectors from menacing the town supply. This restriction should be rigidly maintained.

The McLain reservoir supply should be abandoned. It is unnecessary and dangerous. If used, it should be only in connection with an adequate purification plant.

In case of an accident to the driven well system, temporarily putting it out of commission, in lieu of adequate storage, either the water company would be obliged to draw from the McLain reservoir or take water from the river. It would not be expedient to entirely shut off water from the town. Therefore, since the river water is polluted and dangerous, if it be used it should be first adequately purified. Hence, the necessity appears for the maintenance, by the company, of a filter capable of rendering either the run or the river water safe to supply to the public. The existing filter is inadequate in capacity, the arrangements for the preliminary treatment of the water with chemicals are deficient, and an improvement to the plant in this respect is demanded for public protection if either of the two waters are to be used in emergencies or at any time.

It has been determined that the proposed source of supply will not be prejudicial to the public health and a permit is hereby and herein granted therefor, and for the extension of the street mains in the borough, under the following conditions and stipulations:

FIRST: That at the close of each season's work plans of all water mains laid during the year, with any other information in connection therewith which may be required, shall be filed in the State Department of Health. And, no new reservoir or additional force main, or other extensions or alterations to the existing water works system, as herein otherwise approved, shall be made by the water company unless the plans thereof shall have been submitted to and approved by the Commissioner of Health.

SECOND: That on or before January first, one thousand nine hundred and eight, the water company shall file with the State Department of Health detailed plans of its pumping station and plant, driven well system, filters, supply and force mains, distributing tank, all pipes, valves and appurtenances.

THIRD: The McLain reservoir supply is condemned as prejudicial to the public health, as also is the Clarion River supply and these sources shall not be used by the Clarion Water Company unless the waters thereof be adequately filtered and purified by a plant to be specially provided therefor according to plans which shall be submitted to and approved by the Commissioner of Health. In the event of the Clarion Water Company electing to abandon the said sources, then said company shall forthwith absolutely sever all connecting pipes between its water works system and the said sources and file a certified description of the date and manner of such severance, with the State Department of Health.

FOURTH: The Clarion Water Company shall not drill, or permit to be drilled, any gas or oil well on its property within the now existing boundaries, unless permission to do so be obtained from the Commissioner of Health.

FIFTH: The Clarion Water Company shall make frequent inspections of all gas and oil wells anywhere in the vicinity of Clarion borough, and take prompt action, is necessary, to prevent salt water pollution of any springs, well waters or streams in such vicinity and reports of such inspections and of the operation of the water works system shall be kept on blanks to be provided by the Commissioner of Health and returned to the State Department of Health when called for.

SIXTH: If at any time it shall appear to the Commissioner of Health that the source of supply, or any part of the water works system, has become prejudicial to the public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

The Clarion Water Company is therefore advised to give favorable consideration to the providing of an adequate storage tank on North Hill in the borough. Such storage would be an insurance against any break in the force main, pumping machinery, or driven well system, and might entirely obviate the necessity of ever having recourse to the river or McLain reservoir source.

Harrisburg, Pa., July 23d, 1907.

EAST McKEESPORT, ALLEGHENY COUNTY.

This application was made by the East McKeesport Water Company of East McKeesport, Allegheny county, Pennsylvania, and is for permission to extend water-works for the supply of water to the public within the borough of East McKeesport, and to obtain a new source of supply therefor.

It appears that the said application of May seventeenth, one thousand nine hundred and seven was for permission to extend water works for the supply of water to the public within the borough of East McKeesport, Wilmerding and Wall and the township of North Versailles, all in Allegheny county.

It appears that the East McKeesport Water Company was chartered August thirtieth, one thousand eight hundred and ninety-six, to supply water to the borough of East McKeesport, which it has since done. On December thirty-first, nineteen hundred and two, it bought out the South Versailles Water Company, which was chartered November twenty-sixth, nineteen hundred and one, to supply water in North Versailles township. On February twenty-eighth, nineteen hundred and seven, it also acquired all, or a majority of the stock of the Melrose Water Company, which was chartered August twenty-eighth, nineteen hundred and six, to supply water to the borough of Wilmerding. The borough of Wall, having been recently incorporated from North Versailles township, it is seen that the territorial rights of the said East McKeesport Water Company and the two other said companies which it owns and operates cover the district for which permission is asked to obtain a new source of supply.

The three boroughs mentioned and the township are situated in Turtle Creek valley and on the hills to the south, the district ranging from two to five miles from the mouth of Turtle Creek. On each side of the valley, which is from a quarter to a half a mile in width, the slopes are abrupt and often nearly vertical. The elevations reach five hundred feet above the valley. The hills are cut by numerous ravines. Most of the land is cleared and used for farming. Bordering both banks of the creek and on the main line of the Pennsylvania Railroad, fourteen miles east of Pittsburg, is the borough of Wilmerding and the passenger station. South of it on the summit of the hills lies East McKeesport borough whose citizens have their nearest railroad station in Wilmerding. The borough of Wall lies along the south bank of the creek east of Wilmerding. The Westinghouse Air Brake Company, employing about four thousand hands, is the only manufacturing plant in the district. It is located at Wilmerding. The valley, however, has numerous extensive industries and the region on and about the hills is desirable for residences and will, undoubtedly be developed. The present population of the three boroughs and township adjacent thereto, is estimated to be between eleven thousand and twelve thousand. Houses are said to be in demand with none available for rent. New districts are being developed and they stand in need of water works and sewerage systems. The public sewers in Wilmerding cover nearly all of the town, there are but a few in East McKeesport and less than half a mile of pipe in wall. In the latter two places the customary method prevails of household waste disposal on to or near the surface of the ground in proximity to wells in some cases. Such wells in East McKeesport borough are largely driven or bored and cased with pipe for protection from sewage pollution.

Typhoid fever has been attributed to the use of water from at least one of the springs in the borough, of which there are several, the water of which flows from the end of pipes driven into the side of the hill. Since August first, the current year, sixteen cases of typhoid fever have been reported. The source thereof is undiscovered. The evidence does not point to the public water supply.

East McKeesport and adjacent parts of North Versailles township are supplied by the East McKeesport Water Company which, up to September tenth, nineteen hundred and seven, purchased the water from the Pennsylvania Water Company. It was pumped by the latter at a station maintained in Wilmerding and forced into a standpipe twenty-six feet in diameter and fifty feet high located on a hill near the centre of East McKeesport borough and owned by the East McKeesport Water Company. From this point the water from whatever source will continue to be distributed by gravity. The ground at the standpipe is elevated twelve hundred and thirty feet above sea level and in the southern part of the borough the elevation is about ten hundred and seventy. It is reported that two thousand people use the water which is two-thirds of the entire population. The average consumption is stated to be thirty thousand

gallons daily, which if true, is a remarkable low per capita rate. This would indicate that the use of spring water and that from wells is larger than estimated.

On a canvass made by agents of the Department and from records, it appears that there were thirteen cases of typhoid fever in East McKeesport in nineteen hundred and five, fourteen cases in nineteen hundred and six and two cases to August first, in nineteen hundred and seven.

The Pennsylvania Water Company supplies water to a large number of municipalities adjacent to Pittsburg. Its main source is obtained from filter cribs located in the Allegheny River, but it has an emergency intake into the Monongahela River at Port Perry. Both sources are polluted with sewage. The water is pumped into reservoirs located in the several boroughs within its territory. Wilmerding is supplied by the same company. There has been considerable typhoid fever in this company's district. The resident physicians of Turtle Creek valley appear to think that the water which the Pennsylvania Water Company furnishes is not responsible for the fever. In a few instances contaminated wells and springs were thought to be responsible.

In the borough of Wilmerding in nineteen hundred and five, there were seventeen cases of typhoid fever. In nineteen hundred and six, fifty-nine cases, but up to August first, nineteen hundred and seven, one only. In the neighboring borough of Wall, which at present does not have a water works system but relies upon springs and wells, there was in nineteen hundred and five, one case of typhoid fever, in nineteen hundred and six eleven cases and in nineteen hundred and seven, three up to August first.

So far as the Department is informed, the only, wells in use in the borough of Wilmerding are those at the plant of the Westinghouse Air Brake Company and the two public wells which are drilled, cased and cemented to cut off sources of pollution. One of these wells is located on Commerce street near Westinghouse avenue and is said upon analysis, to have been pronounced free from contamination by a reputable chemist. The other well is located near the end of the viaduct which crosses the creek and the yards of the Westinghouse Air Brake Company and is not of as good quality, although reported to contain nothing which indicates any contamination. The water is said to be derived in part from strata of soapstone, which impart an unpleasant flavor to the water and on this account is but little used.

The wells at the plant of the Westinghouse Air Brake Company are bored two hundred feet deep and encased, so as to cut off possible pollution and are used for drinking purposes. The water is reported to be piped to all departments and make generally available for drinking purposes at the plant. This company uses, for general purposes other than drinking water obtained from the Pennsylvania Water Company.

Other manufacturing establishments in Turtle Creek valley also have private supplies for drinking purposes.

When the Pennsylvania Water Company began to supply water, it delivered raw water from the Allegheny River and there was a considerable amount of typhoid fever and other intestinal diseases attributed to the supply. Later the company installed filter cribs at the intake, which installation was followed by a reduction in the number of cases of such diseases. When the capacity of the cribs became taxed to meet the increased consumption of water, the company resorted to raking and flushing the bed of the river above the cribs to remove the accumulation of silt so as to increase the rate at which water could be obtained from the cribs. As the consumption increased and the rate of filtration in the cribs increased, typhoid fever also increased among the consumers taking water from this company, but it is reported to be a fact that in the districts supplied by this company within the city of Pittsburg's territory, there was less typhoid fever generally, than in the other districts of said city supplied with water by the City Water Works, deriving its source from the same river. In the spring of nineteen hundred and six the water company is reported to have notified all of its consumers by mail and by posted notices in the street cars and throughout the boroughs, that in the interests of safety all water used for drinking and culinary purposes should be boiled. It appears that since that time fewer cases of typhoid fever originated in those boroughs where the injunction to boil the water was generally observed than where little attention was paid to the notification.

When the Melrose Water Company petitioned for the granting of a charter, said company represented that its source of supply would be obtained from five springs at the head of a small stream tributary to Turtle Creek on the south, at the east end of Wilmerding. These springs were located on either side of the ravine at the head of this run and joined a short distance below to form the stream. A contract had been let for the construction of a dam to impound the water. The East McKeesport Water Company, by virtue of its holdings in the Melrose Water Company, has acquired the right to take water from these springs located on the farm of Philip Maser in North Versailles township and the borough of Wall and has constructed masonry enclosures at each spring to prevent the pollution thereof. The company has also laid mains to convey this supply to the borough of East McKeesport, the borough of Wilmerding and Wall. The combined flow of these springs is reported to be between four hun-

dred thousand and five hundred thousand gallons per day, an amount insufficient to ultimately supply the population that may be reasonably expected in the district within a short term of years.

The springs occur at outcrops of rock in the hills south of the borough of Wall. One of them is within said borough limits. The rock is generally shaly. The surface soil, is a sandy or gravelly loam, underlaid by some clay.

Each spring is enclosed in a brick arched masonry vault about three feet square, provided with tight doors locked.

The fields about the springs are used either for the growing of grass or for pasturage.

At the "Redhouse Spring" a drain has been built to intercept water from smaller springs in the vicinity, but it extends to the surface and is liable to receive surface drainage. The tract has not been fenced off to exclude animals. At the "Livingstone Spring" there is danger of pollution from an open privy in the rear of the farm house located about two hundred feet up the hill. This privy should be provided with a water tight vault and receive proper attention. The vault which encloses the spring is inside of a masonry building which is to be used for the storage of milk, etc.

The storage reservoir into which the spring water is piped is located in a narrow gorge. All surface soil and loose rock was removed from the site. The dam is a concrete structure about forty feet high, eighteen feet thick at the base and three feet thick at the top. Loose rock and other material excavated was placed on the lower side of the concrete wall to form an earth embankment. No detail plans of this structure have been submitted.

At the upper end of the reservoir, there are two gullies draining the hillsides. Concrete walls across them are to cut off the surface drainage and divert it into drains, one on either side of the reservoir to below the dam. The wash from the steep hillsides if too rapid might sweep across the drains into the reservoir. A low barrier of earth should be constructed on the reservoir side of the drains to prevent this wash.

If a tight board fence enclosure around the reservoir to prevent the pollution of the water by animal excrement has not been provided, it should be constructed.

As the reservoir is intended to receive the flow from the springs only, the spillway will not be called upon to carry away any sudden increase in the amount of water entering the reservoir. No plans have been prepared for the spillway. Such should be submitted for approval to ensure the stability of the dam and earth embankment outside of it. The Department is not informed as to the extent engineering advice was sought by the water company in the design and construction of this reservoir.

The East McKeesport Water Company's contract with the Pennsylvania Water Company for supply of water expired on May first, nineteen hundred and seven, and thereafter the Pennsylvania Water Company continued to supply water to the said East McKeesport Water Company under special agreement between the two companies. Said agreement was terminated on September tenth, on and after which time, there being no other alternative, water has been furnished from the proposed new source.

The general plan filed contains but little explicit information. It would appear from it that the water is to be furnished by gravity to the boroughs of Wall and Wilmerding, but that the supply has to be pumped into the East McKeesport standpipe from a station located in Wilmerding on Welsh avenue near Florence street.

The hills above the springs and reservoir are sparsely populated and at present may be adequately protected so far as to conserve the purity of the ground water supply. The quality of the water now being furnished by the company to the district should be equal to the quality of the water furnished in the past by said company, but the extent of the water-shed, or the streets in which water pipes have been laid and the details of the system are not known to the Department. It would be impossible without much undue labor for the Department to tell in the event of an outbreak of a water borne disease whether it were attributable to the said ground water supply or the Pennsylvania Water Company supply of springs or private wells. The law requiring full plans and descriptions of water works systems to be filed in the State Department of Health has not been complied with, probably through lack of knowledge of what is required.

While the Commissioner of Health does not determine the charter rights of a private water company, yet an application for approval of plans for the supply of water to the public at wide variance with statutory laws governing such companies would not be considered. The statement of purpose in a charter is presumably to identify the class under which a corporation is desired and as so identified, the corporation takes the power conferred upon that class by statute. The law conferring the powers makes no stipulation as to where the public supplied shall reside. It is a well settled principle that a coroporation cannot supply water beyond the territorial limits for which it was created, and in which it is located, with the exception, that upon the written request of a majority of the land owners in a district adjacent to such territory the company may thus enlarge its territory specifically described.

The supply, however, may come from within or without the district and while rivers and creeks are the most natural source, the company may procure a supply from any other source such as the purchasing of it from another water company, provided, however, that the latter company be allowed to sell it.

It appears in the case in question that the East McKeesport Water Company purposes to procure its supply from springs and a reservoir in North Versailles township and Wall borough and by pipes leading through North Versailles township and Wilmerding borough and a pumping station necessary to raise the water into East McKeesport borough, to supply the public with water in the territory stipulated in its charter, namely East McKeesport borough; and further it purposes to supply the public outside of these limits; but the petitioners have not shown by what right and authority of law the East McKeesport Water Company can sell water in the territory of Wilmerding, Wall or North Versailles. Clearly the Melrose Water Company may sell water to the public in Wilmerding borough, and the South Versailles Water Company to the public in North Versailles township and the borough of Wall, but these companies have not applied for permission to construct or extend water works in their respective territories. The mere ownership of stock in these companies by the East McKeesport Water Company, does not give the latter the right, and in absence of a legal merger of all three companies, the approval by the Commissioner of Health of the proposed water works must be limited to the portion thereof necessary to supply water to the public within the territory stipulated in said East McKeesport Water Company's charter.

It has been determined that the proposed source of supply, pipe lines and pumping station necessary to deliver the water from said source of supply to East McKeesport borough, and the water works extensions within said borough will not be prejudicial to the public health and a permit is hereby and herein granted therefor under the following conditions and stipulations:

FIRST: That each spring be enclosed and covered with a suitable masonry construction provided with a tight fitting door which shall be kept locked so as to prevent pollution by surface drainage or otherwise. And all of the springs except the Livingstone Spring shall be fenced about so as to exclude animals from the immediate vicinity.

SECOND: In the case of the Redhouse Spring, the drain which connects smaller springs in the immediate vicinity with it, shall be covered to prevent surface washings entering the drain and a ditch shall be constructed on the uphill side of the spring to intercept surface drainage and conduct it to points below the spring.

THIRD: The water company shall provide or cause the privy on the hillside above the Livingstone Spring to be provided with a water tight vault, and the contents to be removed, when necessary, to some point from whence the sewage cannot directly or indirectly contaminate the waters to be supplied by said company to the public.

FOURTH: The company shall maintain a sanitary patrol of the water-shed and report monthly to the State Department of Health thereof. The existence of any infectious disease thereon shall be immediately communicated by said company to the Commissioner of Health. Such efforts and precautions shall be taken by said company as are customary and essential to preserve the purity of the water to be supplied. If at any time in the opinion of the Commissioner of Health the source of supply, or the water works, or any part thereof, has, become prejudicial to the public health, then the said water company shall adopt such remedial measures as the Commissioner of Health may advise or approve.

FIFTH: The Company shall cut off surface drainage from the gullies at the upper end of the reservoir by suitable concrete walls extending to solid rock and adequate drains extending from these concrete walls down either side of the reservoir to carry off surface water from the hillside slopes to below the dam, shall be provided. These drains shall be substantially built to avoid erosion. An embankment shall be built between the drains and the reservoir as an added precaution to prevent surface wash into the reservoir. Said reservoir shall be enclosed in a tight board fence to prevent accidental or malicious contamination of the waters in the reservoir. These things shall be done and a certificate thereof rendered by the water company on or before the first day of May nineteen hundred and eight.

SIXTH: Detail plans of the water-shed above the springs and the reservoir showing roads and buildings and the limits of the water-shed and land lines and the location of the springs and the reservoir and the land owned by the water company; and detail plans of the dam and the reservoir, pipes and location of valves and the topography of the reservoir; and detail plans and profile of the supply mains and of the water pipes in the streets of the water district showing sizes, location of gates and hydrants and facilities for draining the system; and detail plans of the pumping station, force main and standpipe and a plan showing clearly the line dividing the pumping district from the gravity district shall be prepared and placed on file in the State Department of Health on or before May first, nineteen hundred and eight. These plans shall be made on a scale not less than two hundred feet to an inch so as to be readily intelligible.

SEVENTH: At the end of each year, plans and profiles of the water mains laid during the season shall be made and filed with the State Department of Health, together with any other information that may be required in relation thereto or the operation of the water works system.

EIGHTH: A complete plan and profile of the dam and the construction of the overflow channel there shall be submitted to and filed with the Commissioner of Health.

NINTH: So much of the East McKeesport Water Company's application, herein considered, as relates to the supplying of water to the public in Wall, Wilmerding and North Versailles township is rejected, being thrown out for the reasons hereinbefore stated. Since there appears to be no law prohibiting the approval of a plan for the supply of pure water to the public in Wilmerding by the Melrose Water Company, and to the public in North Versailles township and Wall borough by the South Versailles Water Company, the source in each case being water furnished by the East McKeesport Water Company at a point in the territory where such a sale of water might be legal, the Commissioner of Health will entertain such applications from said Melrose and South Versailles Water Companies, owing to the fact that there seems to be a demand for and there is need of a pure public water supply for these places.

This permit is issued under the express stipulation that the East McKeesport Water Company's charter rights shall not be exceeded and that all laws regulating and controlling the business in which it purposes to engage shall have been complied with so far as the same may be applicable.

Harrisburg, Pa., November 2nd, 1907.

ELLWOOD CITY, LAWRENCE COUNTY.

Ellwood Water Company.

This application was made by the Ellwood Water Company of Ellwood City, Lawrence county, and is for permission to extend and improve its system of water works in said borough by the enlargement of the reservoir or storage basin of the said water works system.

It appears that Ellwood City borough is a manufacturing town of about thirty-two hundred population and including its environs, four thousand people, located in the extreme southern part of Lawrence county on the south bank of the Connoquenessing Creek one mile above and west of the point where the creek enters the Beaver River.

The people very generally use the public supply, there being reported to be only about fifty driven wells scattered over the borough supplying possibly two hundred inhabitants. The industries use considerable quantities of water, the total consumption being about one million gallons for all purposes in the district.

The Ellwood Water Company was incorporated under the laws of the State in eighteen hundred and ninety-two to supply water to the public in the township of Wayne, Lawrence county and adjacent thereto. This was before Ellwood City became a borough and while the place was not much more than a summer resort located on the sandstone bluff or table land abutting the creek. Now the town extends southerly up the rising ground to the hill in North Sewickley township, Beaver county. Its thriving industries point to a robust growth.

The source from which the supply of water is taken is the Connoquenessing Creek at a point in the north-eastern corner of the borough, and also from a point on Slippery Rock Creek in Perry township, Lawrence county, immediately above the confluence of said creek and the Connoquenessing.

The main supply is taken from Slippery Rock and is pumped through the borough mains to a storage reservoir on the hill in North Sewickley township. This reservoir holds less than one million gallons. The machinery at the pumping station is operated by electricity, generated at the pumping station on the Connoquenessing where there is a dam across the creek built for power purposes. When the Slippery Rock pumping station machinery is not in use, the entire supply of the borough is pumped from the Connoquenessing Creek. The pool formed by the dam extends up stream about three-quarters of a mile. No attempt at purification is made of either source. How much water from each creek is taken is not a matter of record in the State Department. The company has not furnished the Department with plans of its intakes, pumping stations and distributing mains. The system furnishes fire protection to the borough, and at present, there are all told about thirty-four hydrants located at important street corners, and in the yards of the various industrial plants. The pressure is reasonably satisfactory averaging from twenty-eight pounds at high points in the town to nearly one hundred pounds in the lower parts.

The Company purposes to enlarge the storage reservoir to a capacity of four million gallons by constructing new earth embankments with masonry core walls carried up above the height of the flow line of the water. The means by which the water is to be forced into the reservoir and drawn from it, and the facilities for drainage are not clearly shown or described in the plan and report submitted with the application.

The Connoquenessing Creek receives sewage from the boroughs of Zelienople, Harmony, Butler and from other sources. Zelienople is twelve miles above Ellwood City and Butler is twenty-seven miles. The population on the water-shed of the creek above Butler is rural, and the discharge of sewage into the streams on this area caused the epidemic of typhoid fever in Butler in the fall of nineteen hundred and three. The danger of a similar scourge at Ellwood City so long as the water supply is taken from the streams and used unfiltered, is greater and because of the pollution of the Connoquenessing Creek by the sewage of Butler, Harmony and Zelienople, the risk of using this creek water at Ellwood City for drinking purposes is materially increased.

The population on Slippery Rock Creek comprises two boroughs. Slippery Rock borough is the first and is twenty-four miles above Ellwood City. Its population is about one thousand. Grove City is five miles further up stream and has a population of sixteen hundred people. However, it is evident that a less population does not afford security from dangerous pollution and while Slippery Rock Creek is less polluted than Connoquenessing Creek, neither of them are safe sources of supply to the public unless the water taken from these streams be filtered.

In view of the circumstances, approval of the plans of the proposed extension of the water works system is withheld until plans for the purification of the sources of supply, or some other project for the furnishing of a pure and wholesome supply to the public in Ellwood City borough and vicinity be submitted to the Commissioner of Health for approval.

Harrisburg, Pa., April 29th, 1907.

FRANKLIN, VENANGO COUNTY.

Venango Water Company.

This application was made by the Venango Water Company of Franklin, Venango county, Pennsylvania, and is for permission to secure an additional source of supply.

It appears that the Venango Water Company now supplies the city of Franklin and suburbs with water. The city is located at the junction of French Creek and the Allegheny River and lies on both sides of the creek and the west bank of the river. Along the streams are the flats upon which the community resides. These flats are hemmed in between high hills which are precipitous. A few of the citizens only have erected dwellings on the steep slopes.

The principal source of supply of water is from the ground in the valley of French Creek, but copious springs on the hillside are also resorted to. Owing to the difference in elevations the higher occupied portions of the built-up territory are supplied by high service systems while the flats are put on the low service system. Two of the high service districts are furnished with water from springs on Gurney Hill. This hill is south of French Creek and down it in a ravine northward to the creek is Gurney's Run, separating Gurney Hill from Plummer Hill.

Gurney Spring is the most important one and water therefrom is delivered into an iron tank located on Plummer's Hill, supplying the immediate district known as Miller's Addition, all surplus water from the tank flowing into the Liberty street high district system. This latter district is also supplied from Collin Spring located on Gurney Hill from whence the water is piped to an iron tank on Plummer Hill near the other tank.

These springs were approved, together with the other sources of the Venango Water Company, in a permit issued by the Commissioner of Health and dated Harrisburg, August second, one thousand nine hundred and six.

The petitioners represent that the system known as the Liberty street system of the Venango Water Company is inadequately supplied, and as an additional supply can be procured from a spring located along the Pittsburg road in Gurney Run Ravine, on the up-hill side of the road and distant from any dwellings or source of contamination, that a permit be granted for this additional supply. The amount of water produced by the present springs of the Liberty street system is insufficient for domestic use. By attaching the proposed new spring to the system, the supply will be augmented about forty thousand gallons daily, which will be ample, it is estimated, for the district.

It is proposed to convey the water from the spring through a two inch line of pipe to the main line in the ravine leading from the Collin Spring.

The new source is a natural spring cropping out at the foot of a high bank above which the surface of the ground ascends rapidly through a wooded unoccupied territory to the top of the ridge which is elevated about seventy-five feet above the spring.

An excavation has been made in the bank and a masonry basin about six feet square constructed and covered over and made tight for protection. There are three outlet pipes from the tank. One is an overflow and terminates just outside of the wall, the waste water going to the gutter; the second is the supply main, and the third is a pipe leading to a watering trough at the highway. All three pipes terminated horizontally in the inside of the tank.

It has been determined that the proposed source of additional supply appears to be not prejudicial to the public health, and said supply is hereby approved and permission granted therefor, under the following conditions and stipulations:

FIRST: That the conditions and stipulations set forth in the said permit issued to the Venango Water Company by the Commissioner of Health, dated August second, one thousand nine hundred and six, shall be extended to and include the additional source of supply herein approved in so far as said conditions and stipulations may apply.

SECOND: That the overflow pipe from the new well herein approved shall be fitted on the inside of the tank with an albow. Also that the supply main from the tank shall be fitted with a valve in order that the spring may be cut off as a source of supply if necessity should require it.

Harrisburg, Pa., July 12th, 1907.

FRANKLIN, VENANGO COUNTY.

This application was made by the Venango Water Company of the City of Franklin, Venango county and is for permission to obtain an additional source of supply from French Creek, and to approve plans for the filtration of said source of supply.

Franklin is a city of about nine thousand population and its suburbs contain abount one thousand more. It is located on the west bank of the Allegheny River at the confluence of this river and French Creek.

The built up part of the town is largely on the flats which are surrounded by hills. French Creek comes down from the west and south of it in the city is Gurneys Hill and Plummers Hill, the two being divided by Gurneys Run, which flows northerly into the creek.

Smith's Run is the southerly boundary of the city and Gurneys Hills and it empties into the Allegheny River.

North of French Creek there is Gardners Hill at the fork of the river and the creek, and Oak Hill westerly of Garners Hill, the two being separated by Monkey Run, which flows southerly into French Creek within the city.

A small percentage of the city's population live on the hillsides. The industries are mostly on the flats north of French Creek. These flats are about twenty-five feet or more above the creek and are never flooded, but the lower portion of the city, on the Alleghney River is subject to flood.

The Venango Water Company, which supplies the city with water, was cretaed by special act of Assembly, dated April fourteen, eighteen hundred and sixty-three. At present the principal source of supply is obtained from the ground in the vicinity of the pumping station in French Creek township. Copious springs on the hillsides and surface waters therefrom furnish the next, but smaller, volume of the total supply. When all other sources are insufficient, French Creek water is used.

The larger part of the town is on the low service system, and, under ordinary conditions, is supplied with water by gravity from Smith's Run and DeWoody Run and from springs tapped into the supply main below the reservoir on Smith's Run. Also by ground water pumped directly into the system from the French Creek township pumping station.

On account of the fact that Smith's Run reservoir is of insufficient elevation to maintain the desirable pressure on the low service system, it is but little used. During times when the surface water from the two runs is turbid, it is not admitted to the pipes. At such times a greater demand is made upon the supply by the pumps.

When fires occur, the high service district tank is connected with the low service system and the entire town put under high pressure, the water in the high pressure tank and the pumping supply furnishing the water at such times.

There are three independent high service districts. Two of them obtain their supply from springs on Gurneys Hill. They are the Miller's Addition and the Liberty street district.

The third high service district is the Oak Hill system and it is supplied with water from the pumping station. The water is pumped into an iron tank forty feet in diameter and forty feet high, located on Oak Hill about five hundred feet above the pumping station. From here about sixty families are supplied in Franklin and about one hundred and forty families outside of Franklin in Sugar Creek township.

When a fire occurs in the city it is the Oak Hill tank pressure which is put on the whole system.

On the east side of the Allegheny River, opposite Franklin, in Cranberry township, there are a few dwellings supplied with water from a spring.

In the Oak Hill district there is a spring known as Stony Spring, which supplies drinking water to twenty families in the city. Springs in the valley of Emory Run also supply water. This run empties into French Creek at the pumping station. It has its rise in the table land about a mile and a half back from French Creek and about five hundred feet above it. The water shed may comprise about one square mile, and its tributary possibly one-third of a

square mile. At the head of the main stream there are in the neighborhood of a score of dwellings. On the drainage area of the tributary, near the summit thereof, there are four or five habitations. The water company conducts the water of some of the springs in this valley to a dug well at the pumping station. The surface water from the main run is not used. The distance up the run from the pumping station to the spring is about one-half mile.

The pumping station is located near the banks of French Creek above the city, in the center of a little basin bounded by hills, French Creek and Emory Run. West of the pumping station and about one hundred and twenty feet distant therefrom, there is a well eight feet in dameter and thirty-six feet deep, excavated in gravel and walled up in cement masonry through which there are holes to admit of the entrance of ground water. This well extends to bed rock which is sandstone. A suction pipe extends from this pump well to the station. This supply is spoken of as the dug well supply.

East of the station, and within a distance of two hundred and twenty feet, there are eight driven wells sunk through thirty-six feet of gravel and forty feet of sandstone to shale rock. These driven wells are connected with a fourteen inch suction pipe to the pumps. North of the station on the banks of French Creek and about two hundred and fifty feet from the station, there is a settling basin about eighteen feet square and quite deep, the bottom being excavated in shale rock and the sides close sheeted and braced. French Creek water is introduced into this tank, from whence it is pumped through a twelve inch suction pipe. The creek water is strained in a small chamber before entering the tank.

In the pumping station there are two pumping engines. The larger has a capacity of two million gallons per twenty-four hours and is called the low service pump. It is connected up with the dug and driven wells. It is into the dug well that the water from a small spring from the adjoining hill and from the two springs in Emory Run valley is piped. While this pump is termed the low pressure pump, in cases of fire it is connected with the Oak Hill high service tank.

The smaller pump has a capacity of one million gallons daily. It is used for the high pressure service during ordinary times. It is also used to pump French Creek water. By an arrangement of gates, it is possible to use both pumps simultaneously on the low service or the high service. Thus depending upon the manipulation of the gates, French Creek water may be pumped into the Oak Hill district, the low service district, or the Liberty street high service district, or all three of them. A check valve prevents water from the low pressure district backing up into the Smith Run reservoir, but there is a by-pass by means of which the reservoir may be filled by pumping.

On June twenty-seventh, nineteen hundred and six, the water company gave notice to its consumers to boil all water. This was done because the ground water supply had become exhausted, or rather was insufficient to meet the increasing demand of the pumping service. On June twenty-seventh, the total water pumped was in the neighborhood of one million one hundred and twenty-five thousand gallons. The next day it increased to one million one hundred and eighty thousand gallons, of which one hundred and ninety-five thousand gallons were French Creek water. On subsequent days, up to and including July thirteenth, French Creek was introduced into the system, being always pumped into the low pressure service. The largest day's pumping record for the period shows that over three hundred thousand gallons of French Creek water were used. The largest day's pumping record was one million six hundred thousand gallons. The manufacturers are all in the low district. On the high districts reached by pumping there are about one thousand people served. The records show that for a period of twenty-nine days at that time the people in the high districts used on an average of about sixty-four gallons per capita daily and this water was used only for domestic purposes. In the low pressure district the records show that for the same time one hundred and twenty-five gallons of pump water were used per capita. This does not include the gravity supply from Smith and DeWoody Runs, et cetera. This water was used for domestic purposes also, very largely because the city is in the natural gas field and the industrial plants are operated by gas driven engines.

The domestic consumption in the city during the last week in June and the first two weeks in July fluctuated between one hundred and twenty-five and one hundred and fifty gallons per capita daily.

Subsequent to June twenty-sixth of that year, the water company introduced meters on those taps where it was thought the consumers were extravagant in the use of water. Prior to this time there had been no attempt to check water consumption. The meter results conclusively prove that there was a very great waste of water on the connections where the meters were installed.

French Creek, at its junction with the Allegheny River, drains an area of fourteen hundred and fifty square miles. Twenty-eight miles above it, the city of Meadville discharges its sewage into the creek. Between these two cities there are several smaller places on the banks of the creek.

The stream is not a rapid one. There are few mill privileges along its course. The valley is generally broad and the bottom lands are under cultivation to a considerable extent. Shoal waters and a rocky bed afford frequent opportunity for fords. Bridges across the creek are not numerous. The stream below Mead-

ville during the dry season is a succession of pools and shoals. Thus sewage is afforded an opportunity for sedimentation and aeration. This accounts for lack of much evidence of sewage pollution in samples of water taken from the creek at Franklin and analyzed. But sewage is present. In nineteen hundred and five, there were twenty-three cases of typhoid fever recorded in Franklin City, between June tenth and September sixth, nineteen of which used city water, and while upon investigation no evidence was found connecting the epidemic with the city water supply, the general impression prevailed that the use of French Creek water was a public menace.

On August second, nineteen hundred and six, the Commissioner of Health issued a decree to the Venango Water Company, prescribing among other things the following:

"All of the springs and surface waters now belonging to and used by the Venango Water Company shall be properly protected from contamination. When said waters are taken from springs, said springs shall be walled up and covered over and otherwise protected satisfactory to the Commissioner of Health; and where they are taken from natural water courses, the water company shall patrol the watershed and report to the Commissioner of Health monthly regarding the sanitary condition of all properties, dwellings, barns, outhouses, cess-pools and other occupations thereon, to the end that no sewage or deleterious matter shall directly or indirectly contaminate said waters.

"An emergency intake to French Creek is hereby approved, but its use is absolutely prohibitive during all ordinary times, or even in emergencies, except an extraordinary emergency. To regulate this use to the satisfaction of all concerned, it is prescribed and expressly stipulated that the gate or valve on the intake pipe to French Creek shall be closed and sealed to the satisfaction of the Commissioner of Health by a seal to be made by the water company and kept in the custody of the local board of health, who shall have permission to inspect the premises. This seal shall not be broken by anybody but the water company, and it shall not be broken and the valve opended and the creek water used except in an extraordinary emergency as above provided, in the event or which use the State Health Commissioner shall be notified and the local board of health. The water consumers shall be forwarned to boil the water, and thereafter such measures shall be taken as the Commissioner of Health shall prescribe or approve for draining the entire water works system of French Creek water. When the emergency shall have passed the valve shall be closed by the company and the seal affixed by the board of health.

"To the end that the water company may meet the demands of a growing municipality and obviate the necessity of using French Creek water, it is necessary that the water company should look about for some permanent and abundant additional supply, and it is herein stipulated that consent to use the proposed supply herein approved, including French Creek in emergencies, is given on the condition that within one year from the date of this permit the said company shall present plans to the State Health Commissioner for a more abundant permanent additional supply. It is suggested that it be determined whether the maximum amount of water to be drawn from the ground in the vicinity of the present pumping station, without depleting the supply in said vicinity, has been reached. Possibly this source, if wholly developed, will be sufficient to meet all needs for a considerable time.

"To prevent wastes and at the same time conserve the present supply, meters should be generally introduced so far as this may be practicable and consistent with the applications of the company as a business corporation."

On June twenty-seventh, nineteen hundred and seven, the following letter was sent by the Commissioner of Health to the president of the Franklin Board of Health:

"The Venango Water Company wishes to conduct some experiments relative to the increasing of its ground water supply at the present pumping station, during which experiments it appears desirable that said company should utilize the intake between the French Creek and the station. We are informed that the water company will not use any of this water in its water works system, and, therefore, I respectfully request that you permit the valve on the intake main to be opened by the water company for the above purpose and under the condition and stipulation that none of the water shall be introduced into the public water works system. When the tests are completed, kindly see that the valve is closed and sealed as usual, and I would suggest that you have inspections made to satisfy yourself that by no accident or otherwise any of the water from the creek be admitted to the water works system during the experiment. Please oblige by writing me when the tests are completed and the seal placed upon the valve again."

Some experiments were conducted and the results were such that the water company abandoned the idea of obtaining a never failing supply and satisfactory quality of water from the ground. Other projects were considered for an additional supply, so it is reported, and abandoned in favor of obtaining the source of supply from French Creek and filtering it.

During the summer of nineteen hundred and seven, from July twentieth to October eighth, inclusive, forty-nine cases of typhoid fever occurred in the city. Four of them were in July and three of them were in August. The epi-

demic began about September twelfth. There were twenty-seven cases during the remainder of the month and thirteen in October up to the eighth. Of these forty cases, thirty-four were in Ward one on the flats where the district is supplied with reservoir water. All of these thirty-four cases were in dwellings furnished with public water and from information at hand it appears that the reservoir water was furnished up to October fifth, when the reservoir was shut off, the water drained out and the basin cleaned. Four of the cases were in Ward two in dwellings supplied with public water sometimes fed from the reservoir, the other two cases were in Oak Hill district.

Inspections by the Department of the reservoir water shed and that of DeWoody Run showed ten estates thereon, eight of which are occupied. Four of the occupied estates were found to be in an unsatisfactory sanitary condition, and notices were served by the Department on the owners. Three abatements have been effected and the water company purposes to attend to the fourth.

On November twenty-fifth, the water company notified the Commissioner of Health that it had become necessary, in order to supply the city of Franklin, for the company to resort to the Smith's Run and DeWoody Run water-shed. Besides proposing to make a weekly inspection of the water-shed, the letter contained the following:

"The barn-yard will be drained away from any direct drainage. The cows will be kept away from the streams and the drain on the Power place will be carefully taken care of, so that the wash water will not enter the run in a direct manner."

On Smith's Run is the DeLong residence, where there was found to be an overflowing privy and a garbage dump within thirty-five feet of the stream. In the cellar of the residence is a spring whose sides are walled and from which the water flows in an open course out of the cellar and away from the premises into Smith's Run. The drainage of the yard is into this natural water course. Wash water and slops thrown out on the ground would drain into the run and the reservoir supplying the town.

At the head of DeWoody Run a sewer from Power's residence was found to deliver water from a bath-tub and sink to the surface of the ground at a point about six hundred feet from the run. By means of a small channel the pollution of the water in the run was direct and this polluted water was fed into the water pipe system of the town.

Investigations did not reveal the presence of typhoid fever on the water-sheds and therefore, there is lack of evidence of the origin of the incipient typhoid epidemic. Notwithstanding this, however, (and the milk and food supply were investigated) suspicion is attached to the water as the medium of the infection, and the citizens of the town are much wrought up about the supply.

The foregoing facts are evidence that the terms of the permit of the Commissioner of Health were not lived up to. The Department had been led to believe by reports from the water company of occasional inspections that the conditions were entirely different on the water-shed.

The plans submitted for approval provided a plant for the treatment and purification of French Creek water of a normal capacity of one and a half million gallons per day of twenty-four hours, with a maximum capacity of two million gallons.

An addition to the pumping station fifty-eight feet long by forty-three feet wide is to be made and in this building the filter units are to be placed, and under the filters is to be the clear water storage basin. Outside of the building and nearby are to be erected two wooden sedimentation tanks, each thirty feet in diameter and eighteen feet high, holding approximately eighty-five thousand gallons.

The coagulant tanks are to be located on a platform in the building above the filters. Each tank, of which there are to be two, is to be three feet in diameter and three feet high. The one designed for the use of sulphate alumina will consist of cedar and the soda ash or lime tank will be made of steel.

The water from French Creek is to be delivered through the existing pipe to a small intake well to be built just outside of the pumping station. This well is to be fitted with screens and proper arrangement to prevent leaves or other floating matter from entering the suction line.

From the screen well a fourteen inch suction pipe is to extend through and below the new station addition to the pump pit in the old pump house, where is to be installed a centrifugal pump to be driven by a thirty-five horse power gas engine and having a capacity of two million gallons daily, by means of which the water is to be raised into the subsidence tanks located just outside of the building and having a flow line in them of thirty-six feet above the pump. It is the intention to supplement this pumping apparatus with a duplicate steam pumping outfit as an emergency equipment. The tanks are to be covered and, at a combined capacity of one hundred and seventy thousand gallons, will admit of two hours' subsidence, when the plant is being operated at a two million gallon rate. The tanks are to be made of white cedar bound with steel hoops. They will be baffled to retard the flow of water and assist in coagulation. The coagulant piping is to be of iron and lead. The sedimentation tanks are designed to be operated in tandem and the chemicals are to be admitted at the point where the water enters the tanks.

A twelve inch pipe will conduct the subsided water to the filters. There will be four filters, each fifteen feet inside diameter by seven feet high, the tanks to be constructed of cedar in the customary manner. On the bottom of each filter is to be a heavy cast iron manifold, six inches in diameter, into which is to be screwed galvanized iron pipes one and one-quarter inches in diameter, which manifold pipes are to be drilled on six inch centres, in staggard section. Each hole is to be seven thirty-seconds of an inch in diameter and the entire manifold system is to be anchored to the bottom of the tank.

An air manifold system is to rest on top of the water manifold and to be securely held in position by anchors. There is to be a two inch air space between the two maniofld systems admitting of a uniform distribution of the air and allowing space for sand to pass the air pipes without entering the openings. The main air manifold is to be three inch wrought iron pipe with brass pipe branches three-eights inches in diameter, laid in parallel rows six inches on centres. The brass pipes are to be perforated with one-sixteenth inch holes, six inches apart.

The filter manifolds will be connected up to admit of through sterilization of the filter beds with steam.

The filtering materials is to consist of selected sand and gravel. There are to be six inches of gravel, from one to one and a half inches in diameter, placed on the bottom of the filter and to be covered with a six inch layer of gravel ranging in size from three-quarters to one inch in diameter. The third layer of gravel, four inches in thickness, will have diameters ranging from three-eights to three-quarters of an inch in diameter. The total sixteen inch gravel bed is to be covered with a thirty inch layer of moderately fine and well graded filter sand.

Thus it will be seen that there are to be six inches of gravel over the water manifold, and four inches of gravel over the air manifold. The designers believe this will facilitate the best distribution of both air and water in the cleaning process.

The air blower is to be capable of furnishing two hundred and fifty feet of free air per minute against four pounds pressure, and is to be operated by belt and friction clutch from the line shaft. One of the engines used to operate the centrifugal water pump is to be used for operating the blower.

The six inch inlet to each filter through which the coagulated water is to be admitted terminates in a distributing weir in the filter at the surface. This distributing weir is to be of ample capacity to deliver the raw water or carry away the waste water. On the six inch pipe is to be placed a gate to shut off the supply and to admit of wasting of wash water to the sewer. The gate is to be fitted with a butterfly valve and float to maintain a uniform head on the filter at all times.

On the six inch outlet pipe of each filter is to be fitted a controller of the "Open Type", consisting of a cedar box twenty-four inches long, twelve inches wide and twenty-two inches high, fitted with a removable cover and provided with a float control, stilling rack and adjustable weir plate of brass construction, admitting of a wide range of adjustment and free from parts to become corroded.

The wash water supply is to be taken from the pressure line to the city, and a reducing valve is proposed to limit the wash water pressure to twenty pounds or less. Provisions will be made whereby each filter may be rewashed and this first filtered water be drained to the sewer.

The drainage of the entire plant, including the water closets, is to pass through an existing sewer into French Creek at a point several hundred feet below the water works intake.

There is to be an operating platform constructed between the filters and above the main floor, on which are to be the stands for the manipulation of the gates to the filters. The filters may be used simultaneously or independently. The clear water basin under the filters is to be forty and sixty-six hundredths feet long by thirty-six and sixty-six hundredths feet wide, and thirteen and a half feet deep, inside measurements, and will have a capacity of one hundred and thirty thousand gallons of water. It is to be constructed of concrete masonry and made water-tight. Facilities for draining to the sewer either by gravity or by steam ejector are to be provided. The floor over the basin is to be of reinforced concrete and is to support the filters above. There are to be two baffle walls with arches in the basin to cause the filtered water to move at all times. They will also support the weight of the filters. An electric indicating gage is to be placed in the clear water well to show the height of the water therein and call the operator's attention whenever the high water mark is reached. This will be accomplished by the ringing of an alarm bell.

The plans show a twelve inch suction pipe from the clear water well to the fourteen inch suction pipe in the pumping station. Each of the existing pumping engines is to be connected up so that either filtered water or ground water may be pumped to the city.

The improvements are to be installed by a contractor who, after the plant has been completed and put in successful operation, is to furnish a competent chemist to make bacteriological tests of the raw and filtered water and to furnish a table of quantities and kind of coagulants to be use to attain a high and

uniform standard of water purification. Suitable chemical apparatus and reagents are to be provided for making alkalinity tests of the raw water for the determination of the quantity of coagulents required. While sulphate of alumina will be used most of the time, during periods of low alkalinity in the creek water, a small quantity of carbonate of soda or lime may be introduced Suitable orifice boxes are to be provided at the coagulant tanks to permit, the operator to absolutely control the quantities of chemical solution to be used.

The contractor guarantees that for one year from the date of completion of the filter plant when the number of bacteria in the unfiltered water is three thousand or more per cubic centimeter, there shall be a bacterial reduction in the filtered water averaging not less than ninety-eight per cent., and when the number of bacteria in the unfiltered water is three thousand or less per cubic centimeter, the average number of bacteria in the filtered water shall not exceed one hundred in number per cubic centimeter and shall meet the requirements of the State Department of Health. Also that the filtered water shall be bright and clear and practically free from suspended matter, turbidity or discoloration. These guarantees are made subject to the condition that the plant shall be operated in accordance with the contractor's instructions and that the water company shall use a suitable quantity and quality of coagulant or coagulants. The proposed plant is to be capable of giving these results when operated at a rate of two million gallons or less per twenty-four hours, the source of supply being from French Creek.

If the plans be carefully executed and the works properly operated, the guaranteed results should be secured.

Because French Creek is a sewage-polluted stream, there should be no possibility of the introduction of this water into the water works system except through the filter plant. The ground supply appears to be suitable, as now developed, for a limited amount of water. Exclusive of the reservoir source, the present spring and ground water sources and the proposed filtered water source should be capable of supplying the city at the rate of two and a half million gallons daily. In the event of a fire, this rate should appear to be sufficient to furnish the requisite quantity of water. The storage facilities in the clear water basin and in the Oak Hill tank are not adequate for a reserve in the event of a large conflagration, and hence the source should be ample to meet the greatest demand. This makes imperative that duplicate pumps should be installed for the introduction of the creek water to the filter plant. If one pump only were provided and an accident should happen to it, the town might be out of water in a large fire, unless a direct connection were maintained to the creek. This should be prevented and can be prevented by the installation of a duplicate raw water pump. The existing emergency intake between the main pumping engines and the creek should be entirely disconnected. The only channels by which creek water may be admitted to these pumps should be through the filtration plant. If four filter units be not enough, then more units should be added.

The city, through its mayor, Honorable John P. Emery, has entered a protest and has been heard by the Commissioner of Health relative to why approval should not be given to the plans of the Venango Water Company to obtain its additional scurce of supply from the French Creek.

It appears that the city of Franklin is desirous of owning the water works system of the Venango Water Company, and since it is necessary (in order to make payments therefor) to issue bonds secured by said system of water works, and that, therefore, a value should be placed upon said water works, the city, on the twenty-eighth day of August, nineteen hundred and seven, petitioned the Court of Common Pleas of Venango county for the appointment of appraisers to value and appraise the plant of the Venango Water Company. The water company has shown cause why the court should not appoint appraisers, and the question may be argued early in the year of nineteen hundred and eight. It is stated by both parties to the contention that the matter will be taken to the highest courts. Hence a long delay is assured before it is determined whether or not the city may proceed to acquire the plant. Thereafter, several months may be consumed in appraisement and then the final question will come up before the city of whether or not the plant shall be purchased and there is no guarantee that the city at such a late date would acquire the water works plant; but, notwithstanding this situation but in anticipation of the acquirement of the plant, the city asks the Commissioner of Health to disapprove of the propose filtration works on the ground that the public is prejudiced against French Creek water as a source of supply and, therefore, does not want to be compelled to pay the added cost of the filtration works, (estimated at twenty thousand dollars) in event of the municipal acquirement of the water works system.

The mayor represents that in the vicinity of Franklin there is an abundance of pure spring water which can be obtained at a reasonable expense, and, moreover, that a sufficient quantity of ground water may be obtained on land owned by the water company by the drilling or digging of additional wells. The water company answering, states that from the experiments it is believed that the limit of the yield of the gravel bed at the pumping station has been reached, that the company does not wish to own any more real estate nor spring supplies because of the failure of the springs in time of greatest need, and also because of the danger that exists of contamination, and that the

water company is desirous of furnishing an absolutely sure supply of water as well as a pure supply and for these reasons has adopted the plans offered for approval. The president of the water company states that it is essential that the filter plant shall be put in because of the certainty of a shortage of water in the near future. French Creek is sought because of the absolute certainty of the supply.

Were the Commissioner of Health to withhold approval of the proposed filter plant, at least two things might happen: First, a shortage of water in the city; and second, in case of an accident or fire, the introduction of raw creek water into the water works system. The former could be prevented by the installation of meters, but the State does not have power to compel such installation. The latter is a constant existing menace to the public health in Franklin. So also to a less degree is the reservoir water from accidental pollution. The ground supply and the added filtered water from French Creek, coupled with a discontinuance of the use of reservoir water, should obviate both shortage and introduction of raw creek water into the system. The insurance to public health to be afforded by the filter plant proposed, during the many months which must elapse before the city acquire the plant of the water company, if ever, must not be overlooked; and since the State cannot compel the water company to make a choice of supplies and since the company has chosen the French Creek as an additional source and has submitted adequate plans for the purification of creek water, it does not appear that the interests of public health will be subserved by disapproving the proposed filtration works, but to the contrary such interests will be promoted by the proposed filters. The question of other sources of supply not now selected by the present owner of the water works should not be allowed to enter into the consideration.

It has been determined that the proposed filtration works and the additional source of supply will not be prejudicial to public health under certain conditions, and approval is hereby and herein given under the following conditions and stipulations:

FIRST: On completion of the proposed purification plant, the water company shall file with the State Department of Health complete and full detail plans of said plant as built, showing all piping, valves, machinery and appurtenances from the intake at the river to the pumping engines designed to supply the filtered water to the town, together with any other information in connection therewith which may be required by the Commissioner of Health.

SECOND: The proposed filter plant shall be operated under responsible direction of the contractors who erect and guarantee the plant for a period of twelve months in order that the water company's attendants may be afforded a reasonable time in which to become thoroughly schooled in the responsibilities of efficiently operating the water purification plant. A full report of the initial test of the plant shall be submitted to the Commissioner of Health and thereafter the water company shall assist the State Department of Health in making such tests of the plant from time to time as may be found desirable. If necessary, the Commissioner of Health may prescribe standards of efficiency and make regulations for the operation and maintenance of the plant and the entire water works system.

THIRD: Weekly reports of the operation of the water works shall be kept on blank forms satisfactory to the State Department of Health and copies thereof shall be filed with said Department. If at any time, in the opinion of the Commissioner of Health, the water works system or any part thereof, or the water furnished thereby, has become defective, or insufficient, or prejudicial to the public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may advise or approve.

FOURTH: The introduction of raw creek water into the system or anywhere except into the filter plant is absolutely prohibited. Duplicate pumps for supplying creek water to the purification plant shall be installed, each to have a nominal capacity of not less than two million gallons per twenty-four hours. As soon as the filter plant is ready for continuous operation, the emergency connection between the existing pumps now in use at the pumping station and French Creek shall be severed and entirely taken out.

FIFTH: There shall be an attendant at the filter plant during the day and during the night and at all time whenever the filters, or any one of them, be in operation.

SIXTH: The drainage from the filter plant shall, when required by the Commissioner of Health, be otherwise disposed of than into French Creek.

SEVENTH: Smith's Run and DeWoody Run waters shall either be filtered or abandoned.

EIGHTH: The pipes leading from the coagulant solution tanks to the sedimentation basins shall be copper pipes.

NINTH: On or before the first day of January, one thousand nine hundred and eight, the water company shall send in a certified report, stating whether it has complied with the condition in the permit of the Commissioner of Health dated August second, one thousand nine hundred and six, relative to the walling up and covering over, and providing adequate protection from contamination of all the springs used as sources of water supply by the company.

Harrisburg, Pa., December 11th, 1907.

HUMMELSTOWN, DAUPHIN COUNTY.

Hummelstown Consolidated Water Company.

This application was made by the Hummelstown Consolidated Water Company, Hummelstown, Dauphin county, and is for approval of plans for the improvement of its source of supply of water to the public in said borough.

It appears that the Hummelstown Water Company was chartered in the year eighteen hundred and eighty-seven for the purpose of supplying water to the public in the borough of Hummelstown, Dauphin county, and in territory adjacent thereto. On April ninth, one thousand nine hundred and seven, the name was changed to that of the Hummelstown Consolidated Water Company.

The petitioners represent that there are no plans in existence of the streets in the borough of Hummelstown, or of the water pipes and appurtenances of the water works system. In any event, such plans have not been filed with the Commissioner of Health, so that the Department is not informed as to the extent or details by which water is taken from the Swatara Creek and supplied to the public at the present time. It is reported that such detail plans are in process of making.

The borough is located on the south bank of Swatara Creek, about eight miles up stream above Middletown and Royalton, where the Swatara enters the Susquehanna River. The main line of the Lebanon Valley Branch of the Philadelphia and Reading Railroad passes through the town. The population at present is about twenty-five hundred. In the year nineteen hundred it was seventeen hundred and twenty-nine, according to the census. The prospects are for a steady growth. There are several small industries in the town, and a trolley line connecting it with Harrisburg and Lebanon. The land about is a fertile one for agricultural products and the stability of the community is assured. It is not a new place. In the year eighteen hundred and seventy the population was eight hundred and thirty-seven.

There is no public sewerage system in the village. The usual methods of household waste disposal are in vogue. Privies abound, slop water and kitchen waste are discharged into the ground and principally into street gutters.

The Hummelstown Consolidated Water Company supplies water for domestic and general purposes to most of the population in the borough. The plant consists of a pumping station, force main, stand-pipe and distributing system. The water is taken from the Swatara at a point just below the built-up part of the borough and is pumped to a stand-pipe near the pumping station and distant therefrom about six hundred feet.

There is a dam across the Swatara Creek just above the highway bridge which diverts water into a penstock leading to an old flour mill on the side of the bridge road, which mill is now owned by the water company and used as a water power house. Water wheels are installed here and the tail race extends westerly a distance of about a quarter of a mile along the southerly boundary of land owned by the company to the creek. The land bordering the creek and between it and the tail race and also land in the vicinity thereof comprising over twenty-two acres, is owned by the said water company and on it near the bank of the creek the stand-pipe in located.

The pumps comprise one power pump driven by water taken from the penstock and one auxiliary steam pump for use when water is not available. The capacity of each pumping engine is about five hundred thousand gallons daily. The force main is eight inches in diameter and terminates at the stand-pipe which is one hundred feet high and sixteen feet in diameter. The base of this stand-pipe is about forty feet above the creek and level or slightly below the village, which is on a gentle side slope draining chiefly towards the creek above the dam and water works intake.

The stand-pipe when full gives a pressure of approximately forty pounds in the village and has a capacity of one hundred and fifty thousand gallons.

The water consumption is said to be about two hundred and fifty thousand gallons, varying from two hundred thousand to three hundred thousand gallons. During fires the pumps would have to be speeded up in order to supply water for the extra service. If the town grows, a very material improvement in the fire service will be demanded or the insurance rates will be excessive. It is said that the water pipes in the village have sizes ranging from four to eight inches in diameter and that the system comprises about three miles of pipes and from twenty to forty-five hydrants.

About all of the citizens of the town use the public supply, so it is reported. Some of the citizens have private wells on their property, but if reports are true, not over one hundred people drink water obtained from such private sources.

Thus it will be seen that the consumption for all purposes is approximately one hundred gallons per capita. The railroad takes water here and the industries are also supplied

Respecting the quality of the creek water, there has been complaint made to the Commissioner of Health by some of the water consumers. The stream is very muddy after rains and at other times it is black, the water being discolored and turbid when drawn from spigots in the town. The blackness is

variously attributed by citizens of Hummelstown to pollutions from the dye works on the stream below Lebanon and to acid works at Lickdale, and to the operations of the coal washeries situated on the upper part of the water shed.

The Swatara Creek rises in the eastern part of Schuylkill and Berks counties, and flows in a generally south-eastern direction through Lebanon and Dauphin counties to the Susquehanna River at Middletown, traversing all told a distance of about sixty miles and draining approximately five hundred and sixty-two square miles.

The branch in Schuylkill county is in a mountainous district in which there are several coal mines and washeries. This field is known as the Loreberry and Lykens Valley District of the Southern Anthractie Coal Fields. Where it not for the mine drainage and washery drainage, the waters from this mountainous district would be soft and pure. As it is, they are usually black in color and extremely acid until the volume of the stream is augmented by the flow from various mountain tributaries.

The branch from Berks county which is known as the Little Swatara drains a rolling valley land, largely shale formation and under cultivation and partly limestone formation, whose waters are alkoline. Below the junction of these streams, which is about twenty-four miles above Hummelstown, there is a tributary from the east known as Quittapahilla Creek, on whose drainage area is located the city of Lebanon, whose waters are strongly alkaline and polluted by sewage. The mouth of this tributary is about ten miles above Hummelstown.

Both of these streams bring down in suspension matters of a clayey character which imparts a distinct color to the waters and particularly during freshets. Then the sediment is more in the form of mud and the waters present a very yellowish and brownish color.

In former years, considerable amounts of coal have been brought down the creek during freshets and at such times the water was black. Of late years, since the washeries have been put in operation in the coal field, if reports are true, very little coal has been brought down, but the blackness of the water has been almost continuous, except during the muddy condition following freshets. The date of this change in condition of the water is variously reported to be not earlier than nineteen hundred and five. Some of the townspeople and at least one local physician are apprehensive of an outbreak of typhoid fever.

The population on the water shed above Hummelstown is stated to be about fifty thousand, of which twenty thousand are in the city of Lebanon.

Swatara Creek at Hummelstown is used for boating and there are several boat-houses along its bank within a short distance of the intake. The water company has a stable on the banks of the stream just above the intake and there is nothing to prevent the drainage from a manure pile in the rear of the stable from finding its way into the creek.

There is a village known as Hershey, where the Hershey Chocolate Company's plant is located, employing about six hundred hands, the sewage of which is discharged into Spring Creek, a tributary of the Swatara, about six miles (measured along the two streams) above the water company's intake. Above this point there are villages and boroughs on the water shed besides the city of Lebanon, and tests of the water made at the forks of the Big and Little Swatara during the year nineteen hundred and six showed the presence of sewage organisms.

The petitioners submitted a copy of an analysis of the Swatara Creek water collected in March, one thousand nine hundred and seven, and the test, together with the topographical evidence, was sufficient to condemn the supply.

The petitioners state that owing to the muddy condition of the Swatara Creek after heavy rains, it is desirable that the water taken from said creek and supplies to the public should be filtered in order to remove the sediment. The petitioners, however, state that both chemical and bacteriological analyses, as well as an experience of twenty years of continued use of the Swatara Creek as a source of public supply in Hummelstown has proven this source to contain nothing of an injurious character. A plan has been submitted of a generally rapid sand filter of the pressure type, which type is to be adapted to the needs at Hummelstown, but no details whatever are submitted as to the installation. It is stated, however, that the installation is to comprise one filter having one hundred and seventy-five square feet area, to be operated continuously and to attain an efficiency of ninety-seven per cent., guaranteed by the private company which is to install the filter.

It further appears that the petitioners do not purpose to use sedimentation basins either before or after filtration of the water. The filter is to be installed somewhere on the line of the force main between the pumps and the stand-pipe and will be operated by pumping water directly through it to the stand-pipe under a pressure of approximately sixty pounds. Alum also will be introduced before the water reaches the filter. Ordinarily, the rate of flow will be about one and a half vertical inches a minute, or about the accepted rate in good designs, which is equivalent to one hundred and twenty-five million gallons per acre daily. However, during a fire, when the storage of water in

the stand-pipe might be low, the rate of pumping and hence, filtration would be liable to be very materially increased beyond the accepted rate under most favorable conditions when the suspended parts per million in the water are less than fifty.

The plans do not contemplate the installation of but one filter unit, so that during washing, if water be pumped, it must be by-passed raw from the creek to the system in the town.

The filter consists of a cylinder eight feet in diameter and thirty feet long, laid horizontally and filled with concrete on the inside to a depth of two feet forming the foundation for the manifold collecting pipe and the gridiron system, over which is to be placed eight inches of gravel and four feet of sand, filling the cylinder to within about one foot and a half of the top. In this space is to be a trough with perforated top, into which the water is to be forced from the pumps and out of which, through the holes, it is to pass into the filter and through the sand and the gravel collecting system into the force main. When the strainer becomes clogged it will have to be put out of use and the process reversed, that is, the water will be drawn from the force main under pressure in the stand-pipe through the girdiron system up through the filter and overflow the top trough into the pipe there, which must have a connection for wasting this wash water. As frequently as the filter needs washing, it will be necessary to suspend pumping operations, if only filtered water is to be introduced into the water works system.

It has been necessary in a number of places in America, where the waters carry high sediment, to introduce sedimentation prior to the filtration of the water in apparatus of the type proposed and now under consideration, and in a number of instances, this type, which is an old one and very generally discarded, has been abandoned and other filters of more modern design substituted.

During freshets and at other times Swatara Creek water will be very liable to clog the proposed filter in an hour's time. Allowing fifteen minutes for a washing operation and a rate of four times the rate of filtration, it appears that during bad conditions in the creek, the filter unit proposed would not be able to filter efficiently more water than necessary to wash the filter.

No expert, disassociated commercially from a design, would think of submitting one filter unit of the type proposed for the work to be accomplished under the conditions obtaining at Hummelstown. It is evident that the petitioners have adopted the cheapest commercial device possible. The filter would give poor service and at best would hardly be more than a strainer. It would probably clog up rapidly and the gelatinous layer would be broken and the filtered water become unsatisfactory. Pressure filters are only satisfactory under circumstances where the pressure is light and the water subjected to treatment has had a long time for sedimentation; also when there are no sudden and heavy drains or draughts on the filter plant. This type of filter is also unsatisfactory when sewage polluted water is to be purified.

The public in Hummelstown expect that the filter plant to be approved by the Commissioner of Health will merit such approval and give a pure and wholesome supply of water to the public. The endorsement of a filter, therefore, by the State would be accepted as an assurance of safety in the use of the water treated in such a plant. The proposed plans fall far short of these requirements. If filters of the type proposed are to be installed, there should be enough of them to assure continuous operation even under the most adverse conditions of water in the creek, and the cost involved would be considerably greater than that of adopting some other type than the pressure filter.

Even if these were a battery of pressure units, this would not guarantee a satisfactory quality of water, because there is no arrangement for regulation of the filtration rate. The water should be first subjected to preliminary sedimentation and this being necessary, it would be more economical for the petitioners to adopt the gravity type of filter under arrangements that will admit of complete regulation and control.

The minimum flow of Swatara Creek at Hummelstown is probably not less than forty-five million gallons and there is ample power, so that the cost of total pumping at the power house should not constitute a prohibitive cost, and certainly the first installation of a gravity type of filter and the operation thereafter should be less than an attempt to adapt the pressure filter type to the necessities of Hummelstown.

There should be in a good design storage of filtered water to the extent of four or five hours' supply. It would be cheaper for the water company to provide storage of filtered water rather than to increase the filter units to meet the greater demands. The water company needs the services of a competent engineer skilled in the design of modern water purification plants. If such an expert were employed by the company he would be able to devise the best system for the least money, having in mind that at no time any other than efficiently purified creek water shall be introduced into the water works system.

It has been determined that the proposed improvements would be prejudicial to the public health and approval is hereby and herein withheld.

The said water company is advised to employ a competent engineer to work up the details of the water purification plant best adapted to the economy and necessity of the case, bearing in mind the various matters set forth in the above discussion.

An inspector from the State Department of Health will be sent to Hershey to obtain full facts regarding the pollution of Spring Creek there, with a view to bring about a discontinuance of such pollution.

Harrisburg, Pa., August 16, 1907.

INDIANA, INDIANA COUNTY.

Clymer Water Company.

This application is made by the Clymer Water Company of Indiana, Indiana county and is for permission to extend and improve its water works system.

It appears that the borough of Indiana is in White township, Indiana county, and is the county seat. It has a population of about seven thousand people. Prospects for a rapid increase are assuring.

The town is located at the head waters of several runs which are tributary to Two Licks Creek, which is two miles south of the borough. On this creek, about three miles above the borough, the Clymer Water Company has an intake pipe and pumping station, by means of which water is taken from the creek and supplied to the inhabitants of the borough. The drainage of the town is into the creek below this point. The water works system has been in use for about thirty years. The Clymer Water Company is a corporation duly chartered and a consolidation of the old Clymer Water Company of Indiana and the Clymer Water Company of West Indiana. These companies were organized and incorporated in April one thousand eight hundred and eighty-six and proceeded immediately to supply water to the public. Prior to the year one thousand eight hundred and ninety-eight, the water was derived from driven wells located within the borough of West Indiana. During the year one thousand eight hundred and ninety-eight, owing to inadequacy of the well supply, the pumping station was removed to a point on Two Licks Creek where it now stands, since which time Indiana borough, which now includes West Indiana, have been supplied with unfiltered Two Licks Creek water; it is represented that the growth and increased consumption makes additions to the system necessary and to this end it is proposed to make alterations at the pumping station, install filters, construct a storage reservoir and extend its main.

The creek water is at present taken into the pump (capacity five hundred gallons per minute) through brick settling reservoirs of small capacity from which it is pumped through a six inch pipe, a distance of six thousand five hundred feet, into a steel tank located on a hillside near and east of the borough about one hundred and ten feet above the main streets thereof and about three hundred and twenty feet above the pump house. The tank is forty feet in diameter and twenty feet high. The cost of raising the water this height is comparatively small because there is a six foot bed of coal outcropping on the side hill at the pumping station on the thirty acre tract owned by the water company which produces cheap fuel.

An eight inch main runs from this tank westerly through the main street of the borough to a steel tank of the same size as the first one, located on high ground in the north-western part of the borough. Both tanks are of equal elevation and afford a pressure of about forty pounds in the town.

From the western tank, water is pumped, by means of an auxiliary engine (thirty gallons per minute) to an iron tank outside of the borough on the same hill, but about two hundred feet above the pump house or western tank. It it thirty feet in diameter, twenty feet high, is kept continually full and is used only in case of fire. It affords a pressure in the centre of the town of approximately one hundred and twenty pounds.

The service mains in the town have diameters ranging from eight to four inches, and their total length is about eleven miles. Owing to inadequate pressure, capacity of pumps and storage, the fire protection afforded by the system is of little value.

The total area of the municipal territory is approximately three square miles and practically all of it is reached by the water company's main. Out of the total population of seven thousand, one-half take the public water and the other half use private wells and springs which are scattered throughout the town. It is estimated that there are six hundred shallow wells and springs in the borough. The geological structure is a porous shale formation overlying the Kittanning and Freeport coal strata, and on account of surface pollution of the soil, the ground waters in the borough are suspicious sources of drinking supply.

The capacity of the works is estimated at four hundred thousand gallons daily, and the consumption is about two hundred and seventy thousand gallons. Thus it is apparent that for the size of the town, the water company does not do a flourishing business. A very material improvement in the entire system is demanded.

The point on Two Licks Creek where the company has its intake and main pump house is down stream about one-half mile from a tributary known as Ramsey Run. There are numerous streams in the water-shed which has a total drainage area of seventy-seven and two-tenths square miles above said intake. This area is very hilly, about fifteen miles long, averaging four miles in width with a maximum of seven miles.

In the year one thousand nine hundred the population living on this water-shed which drains the greater part of Green and Cherry townships, and a small part of White township, was three thousand and ninety, since then a rapid growth has occurred. Indiana county is witnessing a great industrial development. The vast coal deposits there, hitherto untouched, are now being opened. Along the main branches of Two Licks Creeks, railroads are being built, new towns are being laid off and large and expensive mine openings are being made. On account of these sudden improvements, the corresponding growth in population, which it is estimated will not stop short of from ten thousand to twelve thousand people, the sewage from this increased population and the large volumes of sulphuric acid mine water which will drain into the stream, it will be difficult for the water company to continue to use Two Licks Creek as a source of drinking water and supply for manufacturing purposes, even if a water softening and filter plant be installed and maintained. Therefore, the company has given some thought to the obtaining of a pure source of supply in the future.

More than a year ago the Clymer Water Company requested the State Department of Health to abate nuisances existing on Two Licks Creek shed above the company's pump house. It was then alleged that every effort made by the petitioners and the Indiana Board of Health to abate said nuisances had failed. Whereupon the Department sent an inspector to make a sanitary survey and remove menaces. He was engaged on this work during April, May and June of the year one thousand nine hundred and six, visited five hundred and fifty-one places and abated eighty-three nuisances.

The distances above the water works intake and various tributaries of Two Licks Creek are as follows: One-half mile, Ramsey Run; six miles, Penn Run; eigth and one-half miles, Sample Run; ten miles, Dixon Run; ten miles, Clymer Village; fourteen miles, North and South branch Two Licks Run.

On Ramsey's Run, with few exceptions, the country drained is clean and sanitary, the area can be freed from contamination with but little first cost and occasional inspection thereafter.

Along Sample Run the Buffalo, Rochester and Pittsburgh Railroad has been recently constructed. It now terminates at Saltsburg, or near there. Branch lines are now being laid out by this company all through the county for the purpose of developing the coal mining industry. The shacks where the Italian laborers are housed are serious menaces, hard to contend with. These foreigners do not go to the trouble of using sanitary facilities.

On the main branch of the Two Licks Creek, the mining town of Clymer is being built. It is the scene of great activity and the expectations are that the population there in the near future will approximate five thousand people, most of which will be foreigners who have little regard for cleanliness. The existence of this village ten miles above the water supply intake of Indiana borough would be enough in itself to condemn Two Licks Creek as a source of supply unless the water were protected from pollution by the treatment of the sewage at Clymer in addition to the filtration of the creek water at Indiana.

Dixon Run is subject to pollution by sewage. At Dixonville there are several water closets draining into the stream. A railroad is being constructed the entire length of the run (six miles), Dixonville is half way up the run and everywhere along its course, new houses are being erected. Several new tipples and mine openings are under construction along the railroad which foreshadows a large increase in number of menaces, and the deterioration of Two Licks Creek as a satisfactory source of supply.

All along the north branch of Two Licks Creek, small mining towns are springing up. New and large operations are actually shipping coal. There is quite a contingent of men who do not live in houses. In one of these mining camps, eleven filthy closets were found directly over the stream. On notice given to move the closets back, this was done, but it is reported that drainage from them subsequently went into the stream. At Lovejoy typhoid fever has been reported. One house had four cases, and it appears that all the drainage from this place was thrown directly into the streem. A very rigid sanitary inspection will be required in this district to maintain anything approaching sanitary conditions.

The south branch of Two Licks Creek is in a comparatively fair condition. The villages of Mitchells Mills and the village of Pine Flat appear to be cleanly, but as in similar country towns, the matter of sewage disposal is neglected. Closets overhanging the stream have been removed by the Department's orders. This obtains also with the small village of Penn Run.

During the summer of the year one thousnad nine hundred and six, various communications passed between the Clymer Water Company and the State Department of Health relative to the dangerous pollutions of Two Licks Creek and the necessity for the water company to adopt measures for the protection of its water consumers and also relative to the filing of proper plans and an application for approval of water works extensions.

On August eighth, one thousand nine hundred and six, the water company not having complied with the law relative to the extensions of the water works system, the Commissioner of Health put the case of the Clymer Water Company into the hands of the Department's attorney for legal proceedings, the outcome being that on November seventeenth, one thousand nine hundred and six, the water company submitted plans and report and made application to extend and improve its water works system.

The proposed improvements are designed to increase the capacity of the works to one million gallons daily. They contemplate the construction of a low dam on Two Licks Creek at the pumping station, the installation of a filtration plant and appurtenances, the erection of a new pumping engine and force main to deliver the filtered water into a distributing reservoir, and the construction of a new storage reservoir for filtered water on the hill above the town and the laying down of larger distributing mains in the borough to increase the pressure and afford better fire protection.

The object of the proposed dam is to constantly submerge the suction pipe of the small centrifugal pump capacity one and five-tenths million gallons daily which is to be installed for the purpose of supplying creek water to the filter plant. This pump will have an eight inch suction and a suction lift of approximately eight feet and a total lift of approximately fifteen feet.

A contract has been made between the water company and the Roberts Manufacturing Company of Philadelphia which was executed on the twenty-fourth day of July, nineteen hundred and six, and provided for the construction of two rectangular filter compartments each to be fourteen feet in width by eighteen feet in length by eight feet inside depth, to be located over a filtered water well to be provided by the water company. These filter units fitted with manifolds, pipes, supply and wash troughs, floor stands, coagulant feed apparatus, sand and gravel etc., comprised all the filter company was required to do. The water company was required to provide means for supplying raw water to the filter plant for supplying filtered water under pressure for washing the filters, to furnish a drain for carrying water to waste when the filters are being cleaned, to build the filtered water basin, subsidence basin, etc., under which conditions the water company guaranteed for a period of one year from and after placing the filters in operation, that the two filters shall be capable of delivering a minimum of one million two hundred thousand gallons of water daily, the water to be bright, clear and practically clear from suspended matters, color and turbidity visible to the naked eye. Also that when there are three thousand or more bacteria per c. c. in the applied water, the filters shall effect a removal of an average not less than ninety-seven per cent. and that when the number of bacteria in the raw or applied water is less than three thousand per c. c., the filtered water shall show an average of not more than one hundred per c. c.

The above guarantees were made subject to the conditions that the capacity of the filters shall not be exceeded, that the filters shall be washed as frequently as the condition of the unfiltered water may necessitate, and that a suitable quantity of coagulant shall be used.

Underneath the filters will be a filtered water well fourteen feet wide, forty-nine feet long and fourteen feet deep, capacity approximating seventy thousand gallons. It will act as a balancing well for the pumps and not as a storage basin. The side and bottom of the filtered water well will be made of masonry. The superstructure of the filters will be reinforced concrete. A wooden roof will be provided over the filter plant. The plans call for a subsidence basin twenty-five feet wide, fifty feet long and ten feet deep, having a capacity of ninety-five thousand gallons. At the present rate of pumping six hundred thousand gallons per day, the theoretical time of subsidence in this basin would be about four hours. The water is to be pumped into the sedimentation basin at the bottom in one corner and to be taken out at the top in the opposite and farthest removed corner by means of an overflow weir. Baffle walls are so constructed as to divide the basin into four equal parts. These walls will extend only part way across the basin, there being a space left of about five feet from the end of each baffle to the side wall, the spaces being arranged alternately, so that the passage of the water through the tank will be in a zig-zag direction. The structure is to be of reinforced concrete covered over with a wooden flooring. Provision will be made to drain the basin through a sump well into the creek below the filter plant. No provision is made for pumping the water directly from the creek to the filters when it is necessary to clean out the subsidence basin, but since the water company does not intend to construct the subsidence basin at this time, the plan will be departed from and the new centrifugal pump will deliver the water directly on to the filters.

It is claimed that the subsidence basin is not needed at present because during periods of turbid creek water, which periods do not last more than two or three days, the filter plant and pumping station can be entirely shut down, and the town supply of water taken wholly from the new storage reservoir which will hold ten days' consumption on the basis of the present rate.

The filters are to comprise three feet of sand and twelve inches of gravel. The size of the sand is not specified though it is understood that clear quartz spherical grains, effective size, one and thirty-five hundredths m. m., un-

iformity eo-efficient of about one hundred and fifty is to be used. The wash water and collecting gridiron system placed upon the bottom with strainers spaced six inches on centres is of good design. Reservoir pressure water, the pressure properly throttled, is to be used in washing. There is to be one longitudinal supply and wash trough at the top of each bed to be located approximately one foot above the top of the sand.

The only means afforded for controlling the rate of filtration is by means of a float and butterfly valve on the outlet pipe, operated by the height of the water in the filtered water basin below.

Provisions are made to allow the first filtered water to be wasted.

A new pump, capacity one and five-tenths million gallons daily is to be installed at the pumping station, and in connection therewith a new rising main twelve inches in diameter and ten thousand three hundred feet long is to connect the pumps with the new storage reservoir. The water level in this reservoir will be four hundred and twenty-six feet above the pumping station.

This reservoir will be two hundred and seven feet long by one hundred and sixty seven feet wide at the top and one hundred and thirty-seven feet long and ninety-seven feet wide at the bottom, have a maximum depth of twenty feet and a storage capacity of about three million gallons. The plans do not show an overflow pipe.

The location of the reservoir is on McHenry Hill east of the town and was made with a view to have the excavation therefor sufficient to afford material for the construction of the embankment. The inner slopes are to be one and five-tenths feet to one and the outer slope two feet to one, and the entire interior of the reservoir is to be lined with puddle clay two and a half feet thick, topped with brick set on edge in cement mortar and the top surface thereof grouted with cement. The top of the embankments is to be fifteen feet wide and to have laid therein a concrete walk five feet wide. A fence is to be provided between the walks and the reservoir and the outer embankments are to be seeded in grass. Water is to be delivered into this reservoir at the top through the twelve inch force main. At the opposite end of the reservoir a twelve inch supply main is to lead from the bottom to the town. A ten inch drain will parallel this supply main and empty into Marsh Run. By means of this pipe the reservoir may be emptied. All valves on the inlet and outlet pipes are outside of the reservoir. The embankments will be fenced in. The high water mark in this reservoir will be two hundred and ten feet above the business part of the town. A twelve inch by-pass extends around the reservoir so that when occasion demands that the reservoir be put out of commission for cleaning or for any purpose, water from the pumps may be supplied to the town without passing through the reservoir.

The twelve inch supply main from the reservoir into the town will be about sixty-five hundred feet long. In event of a fire demanding twelve hundred gallons a minute which is equivalent to four fire streams of three hundred gallons per minute, the reservoir if full will be able to maintain a pressure at the end of the twelve inch supply main of seventy pounds or more.

The dry weather flow of Two Licks Creek is, during ordinary seasons, estimated to be seven million gallons daily. On account of acid drainage from mine operations on the water-shed, it is highly probable that the water company will either be obliged to install a water softening plant in connection with the filters or abandon the creek as a surce of supply. Ramsey's Run affords a site for a storage dam by which water could be delivered by gravity to the filter plant. A water-shed of five square miles is capable of development to supply the future needs of the town, but whether such a development would be economical is not known. While this water-shed is not thickly populated, nevertheless, it would not be desirable that the filter plant should be abandoned in case Ramsey Run were used as a source of supply. And so long as Two Licks Creek water is used, suitable and a sufficient quantity of coagulant should be employed, and the benefits thereof obtained by ample sedimentation. This is particularly true because of the many sources of pathogenic pollution existing on the water-shed. It is not considered safe to dispense with this barrier to the admittance of the contaminated water to the town. As at present designed, there is no good opportunity afforded for the coagulant to mix with the water except the chemical be introduced into the suction of the pump and even then the time lapsing between the pump and the sedimentation tank is insufficient to permit of thorough mixture. The first three feet in the basin should be partitoned off and the water allowed to rise and pass over a thin sheet iron weir into the subsidence basin. A thin sheet iron weir trough across the outlet end of the tank would be the best means of permitting the water to escape from the basin.

Another means to greater filter efficiency would be to lower the centrifugal pump so that the suction lift would not be more than a foot or two. The present arrangement is likely to supersaturate the applied water with air.

In a small plant of this kind, safe guards should be afforded against inefficient work due to lack of skill or knowledge of attendants respecting the principles of water filtration, or to safeguard against careless management. It is highly probable that the filter plant as now arranged, especially after washing would be operated at rates several times in excess of the normal and hence at

the sacrifice of efficiency and to the possible menace of the water consumers. Rate controllers should be put on the outlet pipes from the filters. Regulating valves should also be put on the main feed pipe and the branches leading to the filter unit from which wash water is taken for the filters and gauges should be put on these pipes and be so placed that the operator can readily see them.

Great care should be taken in washing filters to prevent the clogging of the sand beds at the corners of the filters farthest from the operating gallery.

Plans have not been submitted of the twelve inch force main and therefore, the Department is not informed as to facilities afforded for readily draining this pipe or for making repairs on any section thereof. These matters will be of importance in case infection in concentrated form were to get into the system.

The omission of an oveerflow pipe at the distrbuting reservoir whereby water should not rise above high water mark without wasting into the drain is contrary to good modern practice.

The drawing off of the water from the reservoir to the town from one point near the bottom is also poor practice. It tends to promote stagnant water and the growth of organisms which impart odor and bad taste to water exposed to light after having been filtered. It is probable that the water company will be obliged to pay attention to these matters in order to maintain a satisfactory quality of water.

A wise precaution would be to admit the water to the reservoir in such a way as to thoroughly spray it and admit of complete aeration.

The fence about the embankments to prevent pedestrians or animals from reaching the storage basin is essential to protect the quality of the water.

It has been determined that the proposed improvements will not be prejudicial to the public health and permission is hereby and herein granted for the proposed extensions and increase of the water supply under the following conditions and stipulations:

FIRST: That on or before the first day of July one thousand nine hundred and seven, the Clymer Water Company shall submit plans for the construction of a sedimentation basin to be installed in connection with the filter plant and as soon as such plans are approved, modified or amended, by the Commissioner of Health, the company shall forthwith proceed with the erection of the sedimentation basin.

SECOND: On or before the first day of July one thousand nine hundred and seven, the water company shall submit a full description of rate controllers to be installed in connection with each filter, together with a description of regulating valves to be installed on the pressure mains supplying wash water to the filters, which, upon approval, shall forthwith be installed by the water company at the plant.

THIRD: On or before July first, one thousand nine hundred and seven, the water company shall submit a plan and profile of the force main, showing the location of all valves, gates and blow-offs, whereby drainage of the pipe may be effected, together with a statement as to what purpose the old force main and tank is to serve and whether or not there is to be any connection between them and the new force main and reservoir.

FOURTH: On or before July first, one thousand nine hundred and seven, the water company shall submit a plan showing the boundaries of the lands it owns in the location thereon of the distributing reservoirs, tanks, pumping stations, etc. On the plan of the land where is located the filter plant and the pumping station shall be shown the banks of the creek, the intake dam, the piping, suctions, force main, all buildings, etc.

FIFTH: The admission of raw creek water to the water pipe system of the town or to any part of the works, except the purification plant is prohibited. Weekly reports of the operation of the plant shall be submitted to the Department of Health on blank forms to be furnished by said Department.

SIXTH: If at any time, in the opinion of the Commissioner of Health, the purification plant is not performing its work efficiently, or, if in his opinion, the water being supplied to the borough of Indiana, is injurious to public health or a menace then the Clymer Water Company shall adopt such remedial measures as the Commissioner of Health may advise or approve.

SEVENTH: No extension of the water works system other than the extension herein approved shall be made unless plans thereof have been filed with and approved by the Commissioner of Health.

Harrisburg, Pa., May 28th, 1907.

LEBANON, LEBANON COUNTY.

Water Works.

This application was made by the City of Lebanon, Lebanon county and is for permission to extend its water works and to obtain an addition supply of water to the public in said city,

It appears that Lebanon is a city of the third class of about twenty-one thousand population, located in the centre of the county and a fertile agricultural district commonly known as Lebanon Valley, but more properly speaking, the Valley of the Swatara Creek.

Its population has doubled in the last twenty years, a fact which is largely attributable to the development of the iron industry. The Lackawanaa Steel and Iron Company and the Pennsylvania Steel Company operate several blast furnaces located in the vicinity. These furnaces are very largely dependent upon the ore supplied by the celebrated Cornwall Iron Ore Bank located five miles south of the city, and are fitted with special facilities required for reducing this peculiar ore. The deposits are capable of furnishing the local furnaces with ore for possibly sixty years, so it is said, but even in the event of their becoming exhausted in the immediate future, it is probable that the furnaces would remain in operation.

However, the manufacture of pig-iron does not constitute the principal employment for the workmen of the city. The community is one of varied industries, non-dependent upon the Cornwall ore deposits. These facts taken in conjunction with the city's proximity to the coal field, sea-board towns, and accessibility to the markets of the country through good railroad facilities, vouchsafe permanency of population and increased growth, and warrant a reasonable investment in permanent public improvements.

The city is bounded on the north by North Lebanon township, the dividing line being the bed of the old Union canal, (the part of the township adjacent to the city being known as the "Independent District"); on the east by North Lebanon and South Lebanon townships; on the south by South Lebanon and North Cornwall townships and on the west by North Cornwall township and the first class township of West Lebanon. The territory so incorporated is about rectangular, contains about two and one-quarter square miles and a population of about twenty-one thousand, which would be increased to about twenty-seven thousand were the area extended to include the built up districts about the borders of the city.

The Greater Lebanon District has water furnished to it by three private water companies and two municipal systems, namely, the Lebanon Water Company, the Hebron Water Company and the Weaverstown Water Company; the West Lebanon Township Water Works and the municipal plant of the city of Lebanon.

Within the city limits the supply of water to the public is furnished wholly by the municipality. There are said to be not over six private wells in Lebanon.

The disposition of sewage is largely into "sinks" so called, which are merely holes drilled into the bed of porous limestone full of cracks and crevices underlying the district. It is common practice to use this method of disposing of house sewage. It is estimated that there are approximately three thousand of these sinks in the city. Occasionally some of the wells fill up and back-flood into cellars, or overflow into streets and alleys and create nuisances. Back-flooding is especially noticeable during times when the Quittapahilla Creek, which comes down from the east through the central part of the city, is in a high stage, and these observations have led to the conclusion that the underground passages beneath the city are inadequate to take off the combined sewage and storm water during very rainy seasons and in consequence the practice of disposing of sewage into the ground here, with the accompanying liability of its back-flooding into cellars, is a menace to the community. Because the city has thus far escaped an epidemic attributable to this method of sewage disposal should not be considered as a guarantee of immunity from such a disaster.

A comprehensive sewerage system for the city is now being considered by the municipal authorities. The cost of a separate sewerage system and sewage disposal plant and some necessary storm water drains has been estimated at upwards of three hundred thousand dollars.

The Lebanon Water Company was incorporated under the laws of the State in eighteen hundred and eighty-eight for the purpose of supplying water to the public within the township of North Lebanon and to such persons, partnerships and corporations residing therein or adjacent thereto as may desire the same. The company therefore is authorized to supply water anywhere in the Greater Lebanon District. It acquired the water rights of the Union Canal Company, and at present furnishes water for domestic and manufacturing purposes in the Independent District, and for industrial uses in the East and West Lebanon Districts. The Philadelphia and Reading Railway Company is a large consumer.

The water used for drinking purposes comes from the Stovers Dam, which reservoir with a series of others located on higher ground north of the city supply water for industrial purposes. A portion of the canal bed is used as an equeduct and storage basin. This water is subject to contamination and would be unfit for culinary purposes. Its use, however, is limited to manufactories. It is estimated that one million gallons daily are supplied by this company and that the system can be enlarged by resorting to the Swatara Creek, in which the company has rights to furnish an unlimited quantity of water for industrial uses at moderate and entirely satisfactory rates.

The Hebron Water Company of Lebanon was incorporated under the laws of the State, in February, nineteen hundred and three, for the purpose of supplying water to the public in the township of South Lebanon, and the Weaverstown Water Company was chartered the following month for a similar

purpose in the township of North Lebanon. Subsequently these companies were consolidated and are now operated as the Weaverstown Water Company. The water is obtained from driven wells located about one and one-half miles north-east of Lebanon and about three-quarters of a mile directly north of the hamlet of Avon, in the valley of a small stream. The water is drawn from a gravel deposit about two hundred feet below the surface of the ground, and is pumped into a masonry reservoir covered over and located on a hill, from whence it is distributed by gravity to the consumers. Most of them live on the borders of the city. A few small industrial plants are supplied with the water which is said to be soft and amply abundant in quantity to supply the district when more thickly populated.

The municipal water works of West Lebanon township comprise driven wells, pumping station, storage reservoir on the hill and the pipe system. The township has a population of about fifteen hundred people, has an area of about one-quarter of a square mile and is undoubtedly destined to become a part of Lebanon City. The drawing of large quantities of water from the ground in the vicinity of Lebanon, even from deep-seated wells, would be quite liable on test to show traces of contamination sufficient to render the operation too hazardous were the waters to be used for drinking purposes without adequate purification. The Department does not now have information as to the quality of said township's supply. Reports of the system have not yet been submitted to the Department as required by law.

Thus it is seen that by annexing the outlying districts, which now are abundantly supplied with water, the city would be possessed of a variety of systems and waters over which it would have no control, with the exception of the West Lebanon township supply.

The City Water Works comprises three impoundnig reservoirs, and auxiliary pumping station, gravity supply main to town and the street pipe system.

The distributing system of mains have sizes which range from four to twelve inches in diameter, and the total length of all this pipe is twenty-six and one-half miles, of which forty per cent. is four inch pipe, thirty-seven per cent. six inch pipe, twenty-two per cent. eight inch pipe and one per cent. twelve inch pipe. When it is considered that the system has for one of its objects fire protection, and that a four inch pipe is not likely under favorable conditions to furnish more than one good fire stream, it becomes at once apparent that with such preponderance of four inch pipe as obtains in Lebanon, unless there are a number of well-placed mains of larger diameter to supply these small laterals, the system is not well adapted to safe guard against losses by fire. Such mains are lacking in the system, to which may be partially attributed lack of water in certain sections of the city during the hours of greatest consumption of the day in dry times. There is not now an equitable distribution of the water in the city.

The reservoirs are located south-east of Lebanon in the South Mountains. This range forms the southerly boundary of the Lebanon Valley, which extends from the Susquehanna River to the Schuylkill River, and is bounded on the north by the North or Blue Mountain Range. The two main streams of the valley are the Tulpehocken and Swatara Creeks, the former flowing easterly to the Schuylkill River, and the latter westerly to the Susquehanna River. Lebanon is in the Swatara basin but near the head waters of one of the Tulpehocken tributaries. To secure a gravity supply it was necessary to resort to the high elevations near the foot of South Mountain where a soft and pure water from springs and mountain streams flowing from uninhabited areas has been impounded.

The Conestoga Creek basin lies south of the South Mountain Range, trespasses northerly into the Lebanon Valley by means of a deep ravine in the mountain known as "Hammer Creek Gap," and drains by its tributary, Hammer Creek, portion of the northern slope of South Mountain, which together with the valley lands comprises over fifteen square miles.

It is on the west branch of Hammer Creek that the reservoirs are located.

Dam Number One was erected in eighteen hundred and seventy-one at the foot of the mountain and is an earth and rock embankment, clay puddled, impounding about eighteen million gallons, with high water mark one hundred and fifty-two feet above Lebanon at the Court House. The area tributary to it is approximately one and eight-tenths square miles.

On the safe water-shed, above Dam Number One, and distant therefrom about six hundred feet is Dam Number Two, which was erected in eighteen hundred and eighty-four, in a ravine through which an easterly branch of the creek flows. The structure is similar to Dam Number One, impounds fourteen million gallons of water and its overflow mark is forty feet above that of Dam Number One. Its water-shed is uninhabited and has an area of about sixty-six hundredths square miles. The water from this reservoir was formerly delivered to reservoir Number One by means of an open ditch following down the valley, crossing under the highway and thence to the distributing basin; but in nineteen hundred and four, owing to lack of pressure and supply of water in the outskirts of the city and on the upper floors of buildings all over Lebanon, a sixteen inch supply pipe from reservoir Number Two was laid and connected with the sixteen inch supply main to the town leading from reservoir

Number One, so that water could be delivered directly from reservoir Number Two with increased pressure to the town. At such times Reservoir Number One and also Reservoir Number Three are shut off.

On the same water-shed above Dam Number One and distant therefrom about one-quarter of a mile is Dam Number Three which was erected in eighteen hundred and ninety-one, in a ravine through which a middle branch of the creek flows. This structure is similar to the others and impounds about twenty million gallons, and its overflow is ninety feet above that of Dam Number One. The water-shed of eighty-six hundreths square mile is uninhabited. The water is delivered to Reservoir Number One by means of an open ditch passing underneath a highway and by several buildings.

The water furnished by these dams is soft and satisfactory in quality, owing to the sandstone formation which yields it, but the quantity is limited and during the latter months of dry years is insufficient for the requirements of the city. In times past various expedients have been resorted to during droughts to meet deficiencies in supply. Quittapahilla Creek water, which is liable to serious pollution, has been pumped into the city supply system and also water from a quarry spring in the Independent District.

In eighteen hundred and ninety-six several wells were bored at South Mountain and an air lift plant installed to obtain an auxiliary supply of ground water, and in eighteen hundred and ninety-seven, a contract was awarded for the development and furnishing of guaranteed additional water supply of at least one million gallons daily of pure soft water by means of wells to be bored or drilled in the vicinity of the existing dams, but in nineteen hundred, upon test of the plant, it was reported that the minimum quantity of water developed was about half of the guaranteed amount, and that the cost of obtaining the water by pumping was nearly three times greater than it should be in consideration of which the project was abandoned.

In nineteen hundred a temporary pumping plant was erected on Hammer Creek near Red Bridge, and a contract let for the construction of a twenty-inch force main to empty into Reservoir Number Two. The following year the permanent pumping plant was erected on Hammer Creek further down stream, where Poplar Run empties into it. This is now the city's supplementary supply to the impounding reservoir.

The pumping station is located in Lancaster county at the lower end of Hammer Creek Gap. The object of this location was to secure the flow of Poplar Run which comes from an uninhabited water-shed of one and one-quarter square miles of similar geological structure to that on the opposite side of South Mountain upon which the impounding reservoirs are located. This flow in a dry time has been measured to be two hundred and thirty-three thousand gallons daily. These are favorable opportunities for the construction of a storage reservoir on this run should this ever be deemed desirable. At present the run water is deverted to the pump well by means of a small dam, and a masonry conduit. When the flow is insufficient, Hammer Creek water may be diverted to the pump well by means of a similar dam and conduit. These dams are masonry structure which serve no other object than to divert the flow of the streams. Sluice gates are placed on the conduits which admit of the regulation of the amount of water taken from either stream and make it possible to shut off either one of them.

Hammer Creek water-shed at this point comprises about seventeen square miles, exclusive of Poplar Run, most of which is north of South Mountain in Lebanon county, which part is under cultivation. The area is about equally divided between limestone and sand stone formations. The northerly part is limestone and abounds in numerous springs which impart hardness to the water. In the north-east corner of the water-shed is the village of Schafferstown with a population of possibly eight hundred, near which the east branch of the creek has its rise.

The people dispose of sewage in privies. From a careful canvas by the city officials for the State Department, it has been determined that there are twelve hundred and ten people permanently residing on the water-shed above the pumping station, and also that there are about five hundred cattle, four hundred horses and one thousand hogs kept on the same area.

A pumping engine of two million, five hundred thousand gallons daily capacity lifts the water through a twenty inch rising main a distance of seventeen thousand eight hundred and ninety-four feet to a summit two hundred and sixty-two feet above the level of the engine house floor, from whence it flows by gravity through three thousand seven hundred and five feet of twenty inch main to Reservoir Number Two whose high water mark is forty-four feet below said summit. The pipe line is provided with numerous blow-offs and air valves.

The water is delivered into the reservoir by means of an aerating device which consists of a vertical pipe out of the top of which the water flows and falls upon a hood which sprays the water, umbrella fashion. The intake conduits to the pump well are provided with a series of vertical screens, the pumping station is a substantial structure with ample floor space provided for an additional pumping unit and the entire layout of the auxiliary supply is of

modern design and of permanent construction. It represents an investment including water rights not exceeding two million, five hundred thousand gallons daily of about one hundred and fifty-five thousand dollars.

A bacteriological test of a sample of Hammer Creek water taken during the summer of one thousand nine hundred and six revealed the presence of numerous intestinal organisms.

Reservoir Number One is not sufficiently elevated to furnish adequate pressure in the town during the hours of greatest consumption. At such times water is supplied to the city directly from Reservoir Number Two through the gravity main which is sixteen inches in diameter for a distance of eighteen thousand one hundred and thirty-seven feet from Reservoir Number One to a small distributing reservoir known as "Smith Dam" (long since abandoned), whose elevation is about one hundred and four feet above the town. From this point the pipe is twelve inches in diameter for the remaining distance of fourteen thousand nine hundred and sixty-four feet.

This main is of insufficient capacity to supply the wants of the town which averages a daily consumption of one million six hundred thousand gallons (estimated). For edequate fire protection the pressure in the town should not fall below fifty pounds at any time. The condition of the present pipe line is such (as evidenced by repeated guagings of the pressure and by experience of the water consumers all over the city) that only during a few hours of each night do the pressures approximate anywhere near fifty pounds and for most of the hours of the day the pressure, especially in the upper stories of buildings generally throughout the city, is unsatisfactory even for domestic purposes.

It is proposed to improve the city service by laying a new twenty inch cast iron gravity main from the Reservoir Number two to the city. Details of this line have not yet been submitted. It is also proposed to lay four lines of twelve inch sub-main northerly through the city and connect the same by a ten inch main running east and west in Guilford street, thus securing complete circulation and equitable distribution of the water to the public. It is proposed to end the new twenty inch main near the southerly boundary of the city, two branch mains from it, each twelve inches in diameter and another sixteen inches in diameter being provided to distribute the water in the town. The first twelve inch pipe is to be laid in Front street, and the second one in Fourth street. The sixteen inch pipe is to extend westerly in Oak street, and to have taken off from it extending northerly the Eighth street main, (a portion of which is to be relaid to provide a twelve inch pipe for the entire length of this throughfare) and the sixteen inch pipe is to terminate in a twelve inch main to extend northerly in Twelfth street. It is also proposed to use the existing gravity supply main to furnish the waters of Reservoirs One and Three to the city during those hours of the day when the pressure they afford will be sufficient to meet the requirements; but the major supply is to come from Reservoir Number two, and primarily from the Hammer Creek pumping station.

The proposed plan, if carried out will afford a pressure of fifty pounds per square inch in the city mains, while the supply main is actually delivering five million gallons daily for consumption, a rate that is not likely to be reached in thirty years or perhaps ever under prudent management because in all likelihood the city will not be called upon to furnish water for industrial uses. The Lebanon Water Company can supply such water at a profit, at rates far below that possible for the city to establish unless it be done at an expense to the consumer and the public. The Weaverstown Water Company is also a factor in the situation. The service it now affords for domestic consumption is superior to that at present maintained by the city, and probably the company's business will keep pace with the growth of the district, provided the source of supply shall continue to prove satisfactory.

If the twenty inch supply main be built of cast iron pipe, its discharging capacity will gradually diminish, owing to increasing roughness, so that in thirty years it may not be able to deliver from Reservoir Number Two, over three million gallons daily, when maintaining a pressure of fifty pounds in the pipe system in the town; but, since it is to be a duplicating main, and the future consumption is problematical, the two gravity mains to the town should be ample until the city shall have attained a population of forty thousand people. A wooden stave pipe of modern construction could be substituted for the twenty inch main at reduced cost with the advantage that its future capacity would be but little less than when the pipe was first laid.

The proposed plan contemplates the use of the soft and pure waters of the South Mountain Reservoirs, as far as practicable, but it is evident that this use will be largely limited to such proportion of this supply as may be available from the water-shed of Reservoir Number Two (one-third of the total area tributary to the three dams) supplemented by Hammer Creek water. Furthermore, it is evident, that in order to maintain satisfactory pressures in the town. Hammer Creek water will be drawn upon to furnish the major supply, which latter source is polluted and dangerous.

The city is committed to these sources by investments aggregating about three hundred and fifty thousand dollars, exclusive of the distribution system in the town. They are assets which the town cannot prudently throw away, yet their use involves a still further and immediate outlay.

Owing to the large population on Hammer Creek water-shed, and to the fact that with large storage, Poplar Run supply, when thoroughly developed cannot furnish all of the water which the pumping station may be called upon to deliver, the interests of the public health demand that the Mammer Creek water shall first be filtered and purified before being introduced into Reservoir Number Two or the distributing system. A good location for such a filter plant is between the summit on the force main line and Reservoir Number Two. A three million gallon filter plant can be installed here for about sixty-five thousand dollars, whose cost of operation should be about three dollars per million gallons of water filtered. The filtered water could be delivered either into Reservoir Number Two or directly into the proposed new gravity main to the town. The twenty inch cast iron supply main and the proposed sub-mains in the town involve an estimated expenditure of one hundred and eighty-five thousand dollars, or a total investment, if a three million gallon filter plant be provided, of two hundred and fifty thousand dollars.

By resource to records it is ascertained that the reservoir supply has furnished all of the water during nineteen hundred and five and nineteen hundred and six, averaging one million six hundred thousand gallons daily; but that for the three months previous years, during the months of September, October, November and December; water was pumped from the Hammer Creek source, averaging one million one hundred and twenty thousand gallons daily for thirty-five days in nineteen hundred and two, one million one hundred and sixty thousand gallons daily for sixty-one days in nineteen hundred and three and one million two hundred and thirty thousand gallons daily for sixty-four days in nineteen hundred and four. The pumping days were of twelve hours each, so the rates for twenty-four hours were doubled the above quantities. Since the measured minimum flow of Poplar Run is two hundred thirty-three thousand gallons daily evidently over eighty per cent. of the water pumped was obtained directly from Mammer Creek.

This source is adequate in quantity without storage to supply all of the water which Lebanon may need for at least a generation. The minimum flow is estimated to be between three and five million gallons daily.There are numerous favorable sites for storage dams along the gap through the mountain where the stream flow could be impounded sufficiently to supply a city several times the size of Lebanon. However, the present rights of the city to divert the stream flow are limited to two million five hundred thousand gallons daily. Further rights will have to be purchased or acquired by condemnation.

It is reported that the assessed valuation of the city is approximately eleven millon dollars, which fixes the constitutional debt limit at seven hundred and seventy thousand dollars. It is also reported that the city's outstanding bonded indebtedness is about two hundred and sixty thousand dollars, so that based on these figures the municipal borrowing capacity is about five hundred and ten thousand dollars, an amount entirely insufficient to provide for extensive water works, sewerage and other public improvements. Since the interests of the public health seem to demand better sewerage facilities, as well as a satisfactory water supply, it is concluded that the interests of public health dictate a husbanding of the city's present investments in water works and their improvement, especially as it does not appear that any other sources are available within the city's means, unless the local authorities wish to enter into negotiations with a private corporation for an additional supply.

The project of connecting Reservoir Number Three directly with the existing supply main to town is suggested as an expedient worthy of consideration in connection with other improvements to the water works herein proposed. By this means a large percentage of South Mountain water would be delivered to the town during the hours of greatest consumption each day.

It has been determined that the proposed extension of the water works and the additional source of supply from Hammer Creek and Poplar Run will not be prejudicial to the public health and permission is hereby and herein granted therefor under the following conditions and stipulations:

FIRST: That all waters taken from Hammer Creek shall be first filtered before being delivered into any storage reservoir or distribution pipe from which water may be drawn for domestic purposes.

SECOND: That before such filter plant is erected or contracted for detail plans of it, together with all other information required in connection therewith shall be submitted to the Commissioner of Health for his approval, and said Commissioner may modify, amend or approve said plans and fix rules and regulations in connection with the operation of said plant.

THIRD: Detail plans of the proposed supply main and sub-mains in town shall be submitted to the Commissioner of Health for his approval before said mains are laid or contracted for.

FOURTH: On or before the first day of July, nineteen hundred and seven, detail plans of the existing reservoirs, dams and their pipes, valves and appurtenances now being prepared shall be filed with the Commissioner of Health. At the close of each year a plan showing all additions to the street mains, or changes in the pipe system made during the year shall be prepared and filed with the Commissioner of Health.

FIFTH: The disposal of wastes of a contaminating nature from the habitations of man or beast on the water-shed of the South Mountain reservoirs or Poplar Run shall be under the surveillance of an officer of the city who shall make monthly inspections and report to the Commissioner of Health any insanitary conditions or sources of pollution. Privies or cess-pools shall not be allowed to become full or overflow, and their contents at proper intervals shall be removed off of the water-shed and properly disposed of.

SIXTH: If at any time the sources of supply or any one of them herein approved be found unsuitable, in the opinion of the Commissioner of Health, for domestic purposes, such remedial measures shall be adopted as the Commissioner of Health may prescribe or approve.

SEVENTH: It is especially stipulated that approval by the Commissioner of Health of the use for domestic purposes of any water from Hammer Creek by the city of Lebanon is withheld unless such water be first purified by adequate filtration.

Special attention of the public authorities is hereby called to the present unequal distribution of the water in the pipe system of the town and the desirability of improving the distribution by the laying of the proposed submains is emphasized.

Harrisburg, Pa., January 2, 1907.

LEBANON, LEBANON COUNTY.

This application was made by the Board of Water and Lighting Commissioners of the city of Lebanon, Lebanon county, and is for permission to obtain an additional source of supply for the public in said city.

It appears that on January second, one thousand nine hundred and seven, the Commissioner of Health of the Commonwealth issued a permit to the city of Lebanon to extend its water works and to obtain an additional supply of water to the public in said city in response to an application duly made by its Board of Water and Lighting Commissioners and authorizing the use of water from Hammer Creek for an additional water supply.

Because a project to obtain water from Hammer Creek has twice been voted down by the people, and because it is confidently believed by the petitioners that if the people be given a chance to vote during the current year on the three fold proposition, namely, an increase of indebtedness for Hammer Creek water, or an increase of indebtedness for Swatara Creek water, or for no increase of indebtedness, the welfare of the public will be best served, therefore, the city officials respectfully represent that permission be given to the city to use the waters of the Big Swatara from a point below its junction with the Little Swatara, under the condition that the local authorities may be free to choose either the Hammer Creek supply as provided for in the said permit of January second, one thousand nine hundred and seven, or the Swatara Creek water as proposed, but that in the event that one shall be chosen, the other source shall be adandoned, water works for both sources shall not be permissible.

The Big Swarata Creek rises in the mountains in Schuylkill county, in the Lorberry and Lykens Valley districts of the southern anthracite coal fields, where there are four collieries and two washeries in operation, and takes a generally south-westerly course through the south-western part of Schuylkill county and then through Lebanon and Dauphin counties to the Susquehanna River at Middletown, and traversing all told a distance of about sixty miles, and draining a total of about five hundred and sixty-two square miles. Twenty miles below its source the stream emerges from the mountains through Swatara Gap into the rolling plains known as Lebanon Valley. Above the gap are the boroughs of Pine Grove and Tremont. Five miles below it is the borough of Jonestown in the forks of the Big and Little Swatara. One of the points from which it is proposed to take the creek water to supply Lebanon is down stream a short distance below the confluence of the two creeks. The other point is two miles further down. It is known as the Cassin site and the former as the Blue Rock site.

If it were not for the coal operations on the Big Swatara, its waters would be comparatively soft and clear. In times past it has proven profitable to gather from the bed of the stream even below the confluence of the two creeks the fine broken coal which heavy rains had washed from culm banks into the stream and thus assured its transportation for many miles before pools were reached or velocities slackened sufficiently to deposit the fine pieces of coal on the bottom of the channel. To-day coal dust, mine and washery drainage markedly characterizes the color of the Big Swatara sometimes for its entire length. The acidity of the stream has not been determined by the Department, but the waters of the creek at Hummelstown have been used for drinking purposes for years. There is reason to believe that the copious and pure and numerous mountains springs and streams so augment the flow of the main stream that the sulphur waters from the coal mines are largely neutralized and hence are not in sufficient quantities to seriously impair the usefulness of the supply as the source of drinking water. At any rate life is abundant in the creek waters which would not be true were the streams markedly acid.

The Little Swatara drains an agricultural district largely in shale formation, but there is a little limestone, hence its waters, though harder than the Big Swatara waters, are comparatively soft, but the stream is known to be always turbid and often muddy after heavy rains. Its contribution to the flow of the main stream is observed by the mingling of the colors of the smaller with the black of the larger creek. The total water-shed tributary to the Cassin site is two hundred and seventy-five miles of which the basin of the Little Swatara Creek comprises ninety-eight and six-tenths square miles.

As would be expected, from the nature of the two water-sheds, the yields are not comparable with the water-shed areas. The minimum flow of the mountainous area is considerably greater proportionately than the minimum flow of the more level and cultivated areas. From the information at hand it appears that the minimum yield per square mile of the Big Swatara above the junction may be four times greater than the minimum yield of the Little Swatara, and that the latter may fall as low as five million gallons daily. In fact, a less flow than this has been observed during a protracted drought for a similar area of like water-shed, so that it is clearly apparent that if the flow of the stream rather than storage, is to be relied upon a point in the main stream below the confluence of the two creeks should be selected from which to obtain a sufficient supply at all times if a consumption of five million gallons daily is to be sought, more specially since it is still further apparent that either waters are not suitable for a public supply without filtration. The storage of filtered water for any great length of time is liable to be attended with deterioration in quality.

The Big Swatara is estimated to yield thirty-five million gallons daily during dry weather. It is not necessary to have records of measurements or run-offs to support the conclusion that there is an abundance of water in the main stream ample many times over for the use of Lebanon City far into the future.

Samples of water collected in September, one thousand nine hundred and six, and examined bacteriologically at the Philadelphia Clinical Laboratory showed the B. coli communis to be present in both the Big and Little Swatara. They were companioned by considerable numbers of ordinary bacteria.

The population living on the entire water-shed above the Cassin site is estimated at twenty thousand, seven hundred and ninety-nine; so aside from the desirability of removing the color and sediment from the creek water is the necessity from the standpoint of a health precaution that the water should be purified by filtration as the most approved and economical means at the present time of treating a polluted supply and rendering it reasonably safe for public uses.

The city purposes to submit to the electors the proposition of taking water from the Swatara Creek, subjecting it to sedimentation and filtration and finally delivering it to the consumers in a purified state under pressure equal to that possible to secure by improving the South Mountain source which is the city's present supply. Details have not been prepared and will not be until after it is known whether the State approves or disapproves of the Swatara as a source of public supply and the electors have authorized an expenditure therefor.

In the main the plan as outlined is to locate a sedimentation basin on the banks of the river, probably either at the Red Rock site or the Cassin site and pump the water, after subsidence, southeasterly a distance of about four miles to a large storage reservoir elevated about two hundred and twenty feet above the creek. The object of this reservoir is to permit a cessation of pumping during those periods when the Swatara Creek is decidedly turbid and its waters, therefore, exceptionally difficult to purify. From the reservoir the water is to be conducted to a filter plant of modern design and the effluent therefrom stored in a covered reservoir to protect its quality. From this clear water storage basin the supply main to the town is to extend.

The capacity of the filter plant is to be five million gallons daily and the design is to admit of the building of a part of the plant only now.

The Department understands that the Swatara project involves about double the expenditure of the project for an additional supply for Lebanon approved by the State in the permit issued January second, one thousand nine hundred and seven. In sanctioning the Swatara project it is fitting that the attention of the voters should be called to several matters, such as the necessity in Lebanon for a general sewerage system, the fact that the interests of the public health dictate the husbanding of the city's resources, that riparian rights of value exist in Swatara Creek and Hammer Creek and that interference with these rights should not be overlooked, but should be carefully weighed and properly set forth before the electors, so that the question of a choice of sources of supply may be intelligently settled.

It has been determined that the additional source of supply from Swatara Creek will not be prejudicial to the public health and permission is hereby and herein granted to the city of Lebanon to obtain said additional source of supply under the following conditions and stipulations:

FIRST: That all waters taken from Swatara Creek shall be filtered before being delivered into the distributing system from which water may be drawn for domestic purposes.

SECOND: That before any basins, pumping station, pipe lines, reservoirs, filter beds and supply mains or distributing pipes, are erected or contracted for, detail plans thereof, together with all other information required in connection therewith, shall be submitted to the Commissioner of Health for approval and said Commissioner may modify, amend or approve said plans and fix rules and regulations with respect to the construction, operation and maintenance of the same.

THIRD: It is especially stipulated that the city shall notify the Commissioner of Health of the outcome of any election to be held for the purpose of deciding the water supply question, and in event of the Swatara Creek having been selected, the city shall entirely abandon the Hammer Creek supply and the Poplar Run supply at the earliest practicable moment, meantime notifying the public whenever such waters are used and emphasizing the injunction as a health precaution that the water be boiled during such times.

FOURTH: This approval of Swatara Creek supply will become null and void in the event of the electors choosing the Hammer Creek additional supply.

Special attention is called to the general discussion of the water supply problem of Lebanon set forth in the permit of the Commissioner of Health to the city of Lebanon dated January second, one thousand nine hundred and seven.

Harrisburg, Pa., August 5th, 1907.

McKEESPORT, ALLEGHENY COUNTY.

This application was made by the Board of Water and Lighting Commissioners of the city of McKeesport, Allegheny county and is for permission to extend and improve its system of water works.

It appears that the city of McKeesport, present population fifty thousand, in round numbers, is located south-east of Pittsburg on the south bank of the Monongahela River and the east bank of the Youghiogheny River. These streams join about opposite the business part of the town at a point approximately twelve miles above the confluence of the Monongahela and Allegheny Rivers.

A small portion of the municipality is supplied by the Monongahela Valley Water Company system, the source being the Monongahela River at Elizabeth borough. The great bulk of the inhabitants use the water furnished by the city of McKeesport.

This municipal system comprises a pumping station, series of driven wells, storage reservoir, auxiliary pumping station for high service district and the distributing pipes.

The main supply is taken out of the Youghiogheny River at a point about one mile above the mouth of the river. Here between the Baltimore and Ohio Railroad and the river is a twelve acre tract of land belonging to the city. It is about fifteen hundred feet long on the river and varies in width from two hundred to five hundred feet. At the narrow end is located the water works pumping station and at the wide end are located the city garbage crematory and the city stables. On the bank of the river is a pump well into which the river water is conducted by a sixteen inch pipe terminating about twenty feet out in the stream, where the water is three feet deep at low stage. From this well one twenty-four inch suction pipe connects with a six million gallon pumping engine, and two twenty inch suction pipes connect with two three millon gallon pumping engines located in the station.

A part of the supply is derived from a series of driven wells located along the river bank on city property. The water is pumped from these wells and delivered to the main pump well at the station.

The city plant supplies about five million gallons daily, of which possibly one-fourth is taken from the ground.

The water is raised through one line of force main sixteen inches in diameter for a part of its length and twelve inches only the remainder, to a five million gallon masonry reservoir, located on a hill in the city and distant about two thousand feet from the pumping station. Two one million gallon pumping engines are installed in a station at this reservoir, and they are used to raise water constinously into the high service district. From said reservoir, water is supplied by gravity to the low service district, which comprises about eighty per cent. of the town.

The ground water contains incrusting constitutents, principally calcium and magnesium sulphates, as high at times as three hundred and fifteen parts per million, which is in excess of that found ordinarily in the river water. Then to, numerous bacterial tests of the ground water show greater numbers of bacteria in it than in the river water. This is attributed to the sewage contamination of the ground from which some of the well water is drawn.

The Youghiogheny is a highly acid stream and notoriously unfavorable for boiler purposes. Ordinarily the water is clear with a bluish, green color, imparted by the sulphate of iron dissolved in the water. Even in freshets, the waters are not so heavily freighted with sediment as the Monongahela and Allegheny. What there is, is coarse rather than clay and rapidly subsides.

Below Connellsville, which is approximately forty-two miles above McKeesport, large quantities of sulphurous mine water are emptied into the stream. Undoubtedly this acid exercises a powerful germicidal effect on the disease

germs which are discharged from municipal sewers into this stretch of the river. Bacterial examinations of the water taken under ordinary conditions of the river reveal the presence of few bacteria and none of the Colon group.

Generally throughout the course above McKeesport, the Youghiogheny is shallow and rapid flowing. The bed is rock and it is coated with iron oxide from Connellsville down to the slackwater near McKeesport. Above the slackwater, opportunities for sedimentation are not afforded so that whatever purification takes place is due to germicidal action and chemical changes which may promote rapid precipitation to a small degree. However, during high stages of the river these purifying agencies are minimized and sewage discharged into the river anywhere on the water-shed may be brought down to McKeesport intake in twenty-four hours time or less. The fluctuation in discharge of this stream are wide and sudden, so that as long as sewage is discharged into this river or its tributaries above McKeesport, the waters are not safe as a source of public supply to the city unless adequately filtered.

During the last ten years, deaths from typhoid fever have ranged annually from eight to forty-eight.

The figures for one thousand nine hundred and four are equivalent to one hundred and twenty-nine deaths per one hundred thousand population which is an excessive rate. A great reduction in rate is expected to follow the filtration of the supply. However, filtration will not of itself render the supply satisfactory because of the high mineral constitutents of the water.

Above Connellsville the water is alkaline. Below it looses this character. The carbonate of lime and magnesia combined with the free sulphuric acid forming sulphates of lime and magnesia which constitute the permanent hardness of hard scale forming compounds, thus reducing the free sulphuric acid and increasing the permanent hardness. Free carbonic acid is also increased. Much of this acid is dangerous in drinking water supplied through lead pipes. Its power to dissolve lead has been known to cause poisoning.

It is proposed to remove or neutralize the mineral acids in a softening plant and to then treat the water by mechanical filtration and to improve the distributing system in the town by enlarging the force main and laying a new pipe through which the water will be pumped directly into the street system overflowing to the reservoir.

The water softening plant is to be erected on the twelve acre tract. Either river or ground water may be delivered to it. Separate supply mains are provided so that the ground water can be treated independently of river water or be cut out altogether. This latter expedient is probable.

The water softening process is to be carried on in a circular brick and tile roof building, three stories high above the basement, the super-structure being ninety-two feet in diameter on the ground floor, sixty-four feet in diameter at the second floor, and the basement is to be one hundred and seventy-seven feet in diameter. The latter is to be wholly underground and to be built of reinforced concrete and in it are to be contained the compartments through which the water subjected to treatment is to pass.

The process is to comprise the combined use of caustic lime and soda ash. The use of caustic lime alone, while neutralizing the carbonic and sulphuric acid would increase the permanent hardness correspondingly. Soda ash alone would give rise to sodium sulphate (which causes water when used in boilers, to foam) and also to an increase in free carbonic acid, while by the combined use of these chemicals, both the hardness and the acidity will be reduced if the process be carefully carried out.

If desirable other chemicals may be used to produce a coagulating effect and remove suspended matters from the water prior to its going to the filter.

The water is to enter the softening plant through cast iron supply mains, one being twelve inches in diameter for the admission of ground water and the other twenty-four inches in diameter for river water. These mains are to discharge into the bottom of separate weir boxes located on the first floor and so arranged that about eighty per cent. of the total inflow will be discharged over the weir to the general mixing chamber, while the remaining twenty per cent. or a certain determined percentage, depending upon the composition of the water at any given time, will be discharged to the lime saturators from whence this water saturated with lime will flow to the main mixing chamber and mingle with the said eighty per cent. water.

Separate weir boxes are provided because the well water and the river water will vary in composition independently of each other, thus requiring different quantities of chemicals. The diverting devices are fitted with graduated scales so that they may be properly set from time to time to meet the requirements determined by frequent tests of the raw river water.

In the central part of the basement and extending through to the top floor of the super-structure, is an open circular shaft eleven feet interior diameter in which is placed an elevator for the lifting of chemicals to the top floor. A space between this shaft and the outer circumference of the basement is divided into three circular rings. The outer of which is thirty-eight and five-tenths feet wide and comprises the settling tank; the middle of which is thirteen and twenty-five hundredths feet wide and comprising the baffled mixing tank; and the inner of which is twenty-five and five-tenths feet wide and comprises

the lime saturating compartment. Each one of these circular rings is divided into quadrants arranged to act independently or in conjunction with any other quadrant. The super-structures covers all but the outer circle.

On the top floor are located the chemical hoppers, a ten horse power motor operated by city water pressure, and the general shafting. On the second floor are located three lime slacking vats, two soda and two coagulant dissolving tanks each mechanically agitated and supplied with chemicals from the hoppers above, a chemical and bacteriological laboratory and a wash water tank holding not over seven thousand gallons and located directly under the water motor on the floor above. The filtered water after passing through the motor is to drop down into the tank and be used when needed for washing the sand filters in the adjoining building.

On the first floor are located the receiving vats for soda and coagulant solutions. The solutions are dropped down from the dissolving tank on the floor above. The milk of lime, however, is passed by means of a pipe from the second floor directly to the lime saturators in the basement. The weir boxes are also on the first floor and also the regulating devices which control the addition of the chemical solutions to the water in the basement in exact proportion to the quantity of water undergoing treatment at any particular time and in proportion to the quality of the raw river water as ascertained by tests to be made at frequent intervals. The many variations in composition of the raw river water will require constant changes in amount of chemicals used. The soda solution may be fed through two regulating devices, one for river water and one for well water, permitting independent treatment.

As previously stated the lime saturating compartment in the basement is divided into four parts so is also the baffled mixing tank and the settling tank.

One of the four lime saturators gets its supply of lime from the unspent lime of the other three saturators. The twenty per cent. raw river water is introduced downward through an inverted funnel in the center of each saturator and passes out under the edge of the cone up through the suspended milk of lime dissolving a sufficient amount of the latter to become saturated lime water, yet traveling upward so slowly that no suspended milk of lime is carried along with the water into the baffled mixing tank. The milk of lime is kept in suspension by mechanical agitation. In order to make certain that the lime water output from the saturators is of full strength, it is necessary always to have in each saturator an excess of milk of lime. Because of impurities, incomplete solution and some precipitation, it will become necessary at intervals to draw off accumulated solids from the bottom of the saturator. A considerable portion will be good lime and to save it the slugs from each of three saturators is delivered by pumping into the fourth known as the preliminary saturator. This saturator being supplied only with this waste milk of lime from the other saturators, would furnish lime water of weak concentration but by passing this weak lime water through another of the three saturators, it becomes thoroughly saturated with lime and is suitable to be used in the softening process. It is planned to operate in turn each of the three ordinary saturators in series with the preliminary saturator.

The baffled mixing tank serves the purpose of thoroughly mixing the chemical with the total bulk of water to be treated. As previously stated it is a circular ring thirteen and twenty-five hundredths feet wide, divided into quadrants and twenty-one and five-tenths feet deep. It is housed over and at the top, on level with the first floor there is a walk about four feet wide in the middle between two channels on either side, each channel being four and twenty-five hundredths feet wide and the bottom three and sixty-six hundredths feet below the walk. The walk is provided to admit of ready inspection of the water in these channels. The inner trough receives the saturated lime water also the soda or coagulant solution and the raw water, and admits them to the mixing tank below where are arranged a series of vertical baffles by means of which the water and chemicals are thoroughly mixed. When operated at a rate of ten million gallons daily, one hour will be consumed in the passage of the water through the entire mixing tank which is equivalent to fifteen minutes passage in each quadrant. The outer trough serves to pass the water from the mixing tank into the settling tank which envelopes the mixing tank.

The settling tank is thirty-eight and five-tenths feet wide and twenty-one feet deep, has a capacity of about two million three hundred thousand gallons, and in turn is provided with a collecting trough at the top near the outer wall which delivers the softened water to the filters.

In case the character of the river water is such that coagulants are necessary to further prepare the water for filtration, the design contemplates that one-half of the plant only shall be used for water softening purposes and the other half used for coagulation of the softened water.

The elevation of the drainage conduits connecting with the settling tank, mixing chamber and saturators is such that ordinarily the drainage will pass by gravity into the river, but during high stages of the stream the drainage from the softening plant and filter will flow to a sump in the central elevator shaft from whence it will be raised by a pump and discharged into the river. At such times the ordinary drain outlet is to be closed by a valve.

Detailed designs of the mechanical filter plant herein considered will be submitted to bidders, but it is the intention of the city to solicit propositions from different responsible filter companies on said designs and on plans of their own also.

The specifications require that the water after filtration shall have a bacteriological content of not over three per cent. of all bacteria in the raw water when the raw water contains more than two thousand bacteria per c. c. and that the bacteria in the filtered water shall not exceed fifty per c. c. when the bacteria in the raw water number less than two thousand per c. c.

The filter house is to be adjacent to the water softening plant. It is to be one story in height above the surface of the ground, built of brick with tile roofing, and be fifty-six and five-tenths feet long by thirty-nine and sixty-six hundredths feet wide. The filters and clear water basin are to be located in the basement.

The filters, of which there are to be six at present, are arranged in two rows of three each, between which the main pipe gallery thirteen feet wide extends longitudinally through the centre of the house. This gallery is to contain the supply main and all pipes and valves connected with the filters. It is to be water tight and on its floor above is to be located the controlling and operating devices. The level of this floor will be about two feet above the water on the filters.

Each filter unit is to be twenty-four feet long by nineteen feet wide, and to be operated at the rate of one million gallons daily. Each unit is to be independent of all others. The sand is to be of an effective size between thirty-five hundredths M. M. and forty hundredths M. M., the uniformity so-efficient is not to exceed one and fifty hundredths and thirty inches of this filtering material is to be laid on a bed of selected gravel twelve inches in depth ranging in size from one-eighth of an inch to one and one-half inches in diameter. The water is to be delivered on to each unit by two parallel troughs twelve inches deep, twenty-two inches wide and extending across the full length and four and five tenths feet from the sides of the filters. The bottom of these troughs will be about three inches above the top of the sand. They are to be used also for collecting and washing wash water to the drain. The filtered water is to be collected by a system of lateral manifold pipes imbedded in the concrete bottom of each unit and being one and three-fourths inches in diameter provided with standard brass streamers set six and one-half inches on centers and connected to a manifold main leading to a ten inch outlet pipe. The wash water is to be admitted through this manifold system. The air pipes are to set above these manifolds and between them, and are to rest on the top of the gravel. They are to be slotted one-half inch pipes off a six inch main.

An automatic regulator is to be fitted to each filter unit, the specification requiring that the rate of discharge from a filter shall not vary more than one per cent. All valves are to be operated by hydraulic pressure.

Under each row of filters is a clear water basin having an effective depth of three and four tenths feet, and a total capacity of seventy-three thousand gallons for both basins. They are connected. Each filter unit is supposed to be capable of filtering one million gallons daily and when so operated, six units being in service, the clear water basin would be filled in twenty minutes. The plan contemplates that this basin shall serve only as a pump well. A thirty inch cast iron delivery main is to extend from the bottom of the basin a distance of about five hundred and forty feet to the pumping station and be connected up, to the existing pumps, the centre of the suction chamber of the lowest pump being about two feet and a half above the surface of the water in the clear water basin when it is full. So it appears that in event of the entire filter plant ceasing operation there would be less than twenty minutes supply to the pump, also that the pumps will have to be operated at rates corresponding to the rate of filtration.

An addition to the present pumping station and boiler house is to be made in which are to be installed a four hundred horse power boiler, one high pumping engine of ten million gallons daily capacity and two low lift centrifugal pumping engines of seven million gallons daily capacity each. The centrifugal pumps are to have twenty inch suctions to the river well. A new twenty-four inch intake pipe is to be extended out into the river one hundred feet.

The plans also contemplate the laying of a new twenty-inch force main to town and the reconstruction of so much of the present force main to the reservoir as will make it a continuous sixteen inch main for the entire length.

Hereafter the pumps are to deliver filtered water directly into the pipe system in the town through the new twenty inch main. The engines will be operated at as nearly a uniform rate as possible, the fluctuations in consumption in the city being met by the stored water in the reservoir on the hill. The use of this rservoir as an equalizer is absolutely necessary in lieu of large storage of filtered water ahead of the pumps.

Arrangements are to be made for the by-passing of raw river water to the pumps in case an accident should occur at the filter plant.

The Youghiogheny river is subject to very material and sudden changes in quality. At such times the danger from pathologic pollution is greatest. The

proposed water softening and filtration plant is complicated in design necessarily and its efficient and economical operation will demand the constant attention of a chemist and skilled attendant.

Probably trouble will be experienced, as is usually the case, with the sediment removing or draining devices and at times it will be necessary to drain each quadrant to admit of complete removal of repairs. The attention of the city authorities is called to the advisability of affording facilities to obviate wasting the great bulk of softened water at the time of draining any settling tank compartment.

The filtered water basin is too shallow and small in capacity to be used as intended. The supply ahead of the pumps should be at least three times greater than now proposed and a new pump well should be constructed of ample dimensions at the pumping station to admit of filtered water being delivered to it by gravity and to also admit of the pump suctions being always covered to a sufficient depth to obviate entrained air. As now designed, the danger line to the new pumping engine was drawn down to within two feet of the bottom but if they should cease to work at any time, and the pumps were run at a rate of six million gallons daily, there would be a margin of only ten minutes between a full basin and the danger line. This space of time is altogether too little. While the pumping engines might be provided with vacuum breakers and the new pump well might be provided with facilities for instantaneous inflow of raw river water, yet the cheapest and altogether best insurance that can be afforded to the pumping machinery is the enlargement of the clear water basin.

The city authorities have neglected to file with the Commissioner of Health a report and plan of the existing water works system required by law.

It has been determined that it will not be prejudicial to the public health for the city to carry out the proposed improvements and increased water supply, and permission is herein and hereby granted therefore under the following conditions and stipulations.

FIRST: That a complete set of plans of the driven well system, pumping station plant, intake well and piping, force main, distributing reservoir, high service pumping station, and plans of the pipes in the high and in the low service districts of the existing water works system shall be prepared without delay and filed with the Commissioner of Health, together with a satisfactory report of said works.

SECOND: That the proposed mechanical filtration plant is hereby approved with the provision that the clear water basin capacity shall be increased to not less than two hundred thousand gallons, and that a new pump well of ample dimensions shall be built at the pumping station to which all filtered water shall be delivered and from which it shall be taken by the pumping engines. Plans for the enlarged clear water basin and the new pump well shall be submitted to the Commissioner of Health for approval.

THIRD: That in the event of the substitution of bidder's plans for the mechanical filter plant herein approved, then such plans shall be submitted to the Comissioner of Health for approval before said works are constructed.

FOURTH: The admission of raw river water to the water pipe system of the town or to any part of the works except the water softening or filtration plant is prohibited except in extraordinary emergencies. This obtains also with respect to the ground water. To safeguard the public interests there should be an emergency intake from the river to the new pump well. The valve on this intake shall be closed under seal. Whenever used the Commissioner of Health should be notified. Plans for the quick introduction of raw river water into the filtered water pump well, which introduction may be by gravity or pumping, shall be submitted to the Commissioner of Health for approval.

FIFTH: Plans of the work when built as herein provided for shall be submitted in detail and filed with the Commissioner of Health, together with such other information in connection therewith as he may require.

SIXTH: A chemist and skilled attendant shall be placed in charge of the operation of the water softening and filter plant. Weekly reports of said operation shall be submitted to the Commissioner of Health on blanks to be furnished by the State Department of Health.

SEVENTH: If at any time in the opinion of the Commissioner of Health, the said water softening and filter plant is not performing its work efficiently and the water being supplied to the town is or may be injurious to public health, then the city of McKeesport shall adopt such remedial measures as the Commissioner of Health may approve or suggest.

Harrisburg, Pa., March 7th, 1907.

PORTLAND, NORTHAMPTON COUNTY.

Portland Water Company.

This application was made by the Portland Water Company of Portland borough, Northampton county, Pennsylvania, and is for permission to install a new system of water works for the supply of water to the public in said bor ough.

The borough of Portland is chiefly an industrial community, of about six hundred inhabitants, located on the west bank of the Delaware river in Upper Mount Bethel Township, about five miles below the Delaware River Gap, Monroe county.

The natural resources of the district, outside of the agricultural products, consits principally of the slates and limestones, and there are several extensive quarries for these rocks in the vicinity. Within the borough there is a lime kiln and also a factory in which slate is prepared for various uses.

The surrounding country is open, undulating land, sparsely populated and under high state of cultivation. Northerly parallelling the river and near it is a highway locally known as the "Water Gap Road," which is much travelled. Between this thoroughfare and the river are the tracks of the main line of the Delaware, Lackawanna and Western Railroad. The passenger station of this railroad in Portland is located at the foot of Main street where there is a highway bridge crossing the Delaware river to the village of Columbia on the opposite bank in New Jersey. From this station westerly there is a branch line to Bangor. There is also a line belonging to the Lehigh and New England Railroad Company which extends westerly through the northern tier of townships in Northampton county paralleling and a little south of the Blue Ridge Mountains to the Lehigh river.

In nineteen hundred the census population was four hundred and ninety. In consideration of the foregoing facts, present indications do not point to a rapid future growth, and a water works project ample in design to meet the demands of a moderate growth is all that the case seems to demand.

The built-up part of the borough is clustered about the passenger station and along the river road. The land is adapted for surface drainage. There are no sewers either public or private. Excrement is deposited in shallow dug privy vaults. There are reported to be about twenty cesspools from which the water seeps away into the ground.

The citizens obtain their drinking water principally from dug wells. In the neighborhood a score of roof water cisterns are in use as a source of domestic water supply to individual estates. While the proximity of cesspools and privy vaults to the dug wells renders the waters of the said wells at least suspicious, it does not appear from records of the local health officers that any unusual amount of sickness has occurred to draw attention to the existing source of water supply. However, the demand for a system of public water works that shall afford drinking water and fire protection has been sufficient to warrant the passage by the borough council of an ordinance granting a franchise to the Portland Water Company to lay water pipes and mains through the streets of the borough and to repair or extend the same subject to certain conditions and stipulations, among which is the stipulation that the supply shall be spring water of good quality.

The Portland Water Company was chartered February ninth, nineteen hundred and four, for the purpose of supplying water to the public in the borough of Portland, and in this borough only.

The project now submitted for approval consists of the obtaining of a mountain supply, the construction of an intake dam across a brook at a sufficient elevation to permit the water to flow by gravity through a delivery main to the borough.

On the southern slope of the Blue Ridge Mountains, more particularly the Kittatinny Range, are the head waters of numerous mountain brooks which flow into Slateford Creek, whose course is easterly into the Delaware river at Slateford, a hamlet about two miles above Portland. On the branch of this creek nearest to the river, which branch has a water-shed of probably less than one square mile, the water company purposes to erect a small intake reservoir by means of a concrete dam across the creek from bank to bank, a length of about ninety feet. The concrete masonry is to be imbedded in slate rock and the top of the dam, which is to be three feet thick, is to be from eight to eleven feet above the present bed of the channel. The thickness of the dam at the bottom, fourteen feet below the top, is to be twelve and thirty-five-hundredths feet. Wing walls are also to be constructed of concrete. Because the bed of the brook falls rapidly this dam will not back-flood water more than about two hundred feet and the area of the water line will embrace less than one quarter of an acre. It is evident at once, therefore, that this reservoir is to serve more for an intake than for storage purposes.

Since the elevation is not given the height of the water in this reservoir above Portland borough is not known, but it is somewhere in the neighborhood of three hundred feet.

No plan of the facilities to be afforded for draining off the reservoir are submitted, neither are the details of the piping and valves shown.

The petitioners have not submitted a plan of the water-shed. It is steep, heavily wooded and also occupied, there being six farms and residences thereon.

The water company has also failed to show a plan and profile of the supply main to the town and of the distributing pipes in the streets, so that the Department is unable to determine what facilities are proposed for the speedy draining of the system or any part thereof, should necessity require this in

the interests of public health. It appears from a statement of one of the company officials that the said supply main is to be six inches in diameter. The plan shows that this pipe is to be laid down the valley of the brook to a public highway in the Slateford Creek valley and thence in said highway to the "Water Gap Road" at Slateford hamlet and thence southerly along said road to the borough, a total distance of about three miles. The petitioners purpose to supply would-be consumers who reside along the line of this route, all of which is in Upper Mount Bethel Township and beyond the territory to which the company is limited by its charter. It is expected by the petitioners that the railroad companies will purchase the water for locomotive uses. Also that the citizens of the borough will very generally connect with the system and that the consumption of water will be in the neighborhood of fifty thousand gallons daily.

On the day of the Department's inspection, the flow of the mountain brook near the site of the proposed dam was measured to be slightly above five hundred thousand gallons daily. The report that the springs at the foot of the mountain which feed the brook never dry up but always yield an ample flow has not been confirmed. The water company contemplates the erection some time in the future of a second reservoir on the brook about one thousand feet up stream from the first reservoir, the second reservoir to be much larger and sufficient in size to store water for dry periods. No details of this reservoir have been submitted. It is quite possible that during a protracted dry season, the flow of the brook and amount of water stored in the first reservoir might be insufficient for the town's purposes. But since such a failure would not necessarily imperil the public health, involving only the curtailment of water consumption temporarily, the water company purposes to develop the storage resources as experience may prove necessary.

Furthermore, it is also reported by one of the company's representatives that the service mains in the borough are to be two inches and four inches in diameter only. By the terms of the franchise the said company shall erect at least five fire plugs along its mains at points to be designated by the authorities of the borough and terms for the payment to the company by the borough for these five plugs and for additional ones are prescribed in the franchise.

While inadequacy of sizes of the proposed water pipes to furnish proper fire protection does not in this case warrant disapproval of the plans, it might, under some circumstances, involve the question of public health. If the assumption as to local elevation be correct, the proposed six inch supply main will not be adequate in capacity to furnish two or more fire streams in the higher portions of the borough equal to the standard required by fire underwriters. This would be so even were the street mains to be increased in diameter from four inches to six inches. The said supply mains should be eight inches in diameter on the above assumption. The borough authorities should be made fully aware of these facts to avoid any misunderstanding respecting the conditions under which the plans are approved by the State officials.

It has been determined that the proposed source of supply and the proposed system of water works will not be prejudicial to public health under certain conditions, and a permit is hereby and herein issued therefor, under the following conditions and stipulations:

FIRST: That a plan of the water shed above the proposed lower dam shall be prepared from actual survey to be made or caused to be made by the Portland Water Company, whereupon shall be plotted highways and occupied estates and the lines of all lands purchased or leased or in which the said water company may have an easement, and such plans shall be filed with the Commissioner of Health on or before the completion of the construction of the proposed lower dam and reservoir.

SECOND: The water company shall monthly make an inspection of every occupied estate on the water-shed to determine if any nuisance or menace or source of sewage pollution to the waters of the State thereon exists and shall report immediately to the State Department of Health. The Commissioner of Health will issue orders to the owners or occupants of occupied estates for the sanitary protection of the waters to be supplied by the Portland Water Company to the public.

THIRD: The site of the proposed reservoir shall be thoroughly grubbed and cleaned and all organic matter and mud removed therefrom. Ample facilities shall be provided at the dam for the proper and complete drainage of the reservoir and for the shutting off of the supply from the town if need be. A detail plan of these facilities for drainage and all pipe connections and valves shall be submitted to the Commissioner of Health for approval before the works are constructed and no additions or new reservoirs shall be made thereafter unless approved by the Commissioner of Health.

FOURTH: If at any time, in the opinion of the Commissioner of Health, the said source of supply or the water works or any part thereof have become prejudicial to public health, then such remedial measures shall be adopted as said Commissioner may advise or approve, and such reports of the monthly operation of the system shall be made to the Department of Health as may be required.

FIFTH: Ample facilities for ready drainage of the supply main to the town at low points shall be provided and a profile of this line shall be submitted for approval before the main is laid. A plan of the borough showing the streets and in them the proposed water pipes, the location of the gates, hydrants, blow-offs and drainage facilities, not overlooking the sizes of the pipes, shall also be prepared and filed with the State Department of Health. And at the close of each season's work a plan of the extension to the street mains laid during the season shall be prepared and filed in the office of the Commissioner of Health.

SIXTH: Because the small sizes of proposed pipes might involve public health, it is expressly stipulated that approval of them is herein given on the condition that the borough council shall also approve the sizes after having been made acquainted with the discussion of the subject hereinbefore had; reserving the right, however, to immediately modify this stipulation if it should appear to be for the interest of the public health to do so.

It is the intention of the State Department of Health to occasionally collect samples of water from the proposed supply and to make tests thereof, and in accepting this permit, the water company obligates itself to co-operate with the State officials.

It is expressly stipulated that this permit is issued under the further condition and provision that the water company shall have complied with all laws applicable to the case relative to the business in which it purposes to engage. It is suggested that the proper way for said company to obtain approval of a plan to supply the inhabitants of Upper Mount Bethel Township with water is by first obtaining authorization to do so by charter.

Harrisburg, Pa., November 23, 1907.

RIDGWAY, ELK COUNTY.

This application was made by the borough of Ridgway, Elk county, and is for permission to extend its water works and to obtain an additional source of supply.

It appears that Ridgway is a substantial and wealthy residential and manufacturing community, of about six thousand seven hundred inhabitants, located on the main line of the Philadelphia and Erie Division of the Pennsylvania Railroad system and on the Buffalo, Rochester and Pittsburg Railroad in the valley of the Clarion river at the confluence of the river and Elk creek.

It is the county seat and the largest and most important of three incorporated municipalities of Elk county.

The town occupies both banks of the Clarion river whose course here is generally southerly, and both banks of Elk creek, which comes down from the northeast and joins the river in the heart of the borough. These two streams divide the town into three districts, comprising Ward One, the old part of Ridgway south of the creek and east of the river, Ward Two, the territory west of the river, and Ward Three, all of the borough land east of the river and north of the creek.

The main industries are principally in Ward Three. Above the dam across the river is Eagle Valley Tannery and the machine shops and foundry of the Elk Tanning Company. Next in order up stream are the works of the Ridgway Dynamo and Engine Company and the yards of the Ridgway Brick Company. Half way up Elk creek in the borough is an old dam site and above this are the works of the Russel Car and Snow Plow Company, and immediately above is the plant of the Ridgway Machine Company.

In Ward Two are the dwellings of many men employed at the Ridgway Tannery, which plant is in Ridgway township, immediately west of the borough and near the banks of the river.

These and smaller industries support the town. In nineteen hundred, the population was three thousand five hundred and fifteen, and in eighteen hundred and ninety, it was one thousand nine hundred and three. So it appears that the growth has been rapid. Natural gas is abundant in the region about Ridgway and oil is produced in limited quantities. Some coal workings are in operation. Freight rates and transportation facilities from the lakes and other points are not unfavorable to the further expansion of Ridgway's industrial boom. The tanning of leather has been the predominate industry, together with lumbering. While the local supply of bark has long since been practicaly exhausted, yet the local tanneries appear to be in a thriving condition and it is possible and probable that they will continue to contribute to the material prosperity of the community. The general offices of the Elk Tanning Company, operating approximately fifty different works in the country, are in Ridgway. The interests centred here, the enterprise and the natural resources all warrant the expectation that the borough will continue to grow, provided its natural healthful conditions be maintained. So public improvements when made should contemplate the time when Ridgway will contain a much larger population.

Sewage and manufactured wastes are discharged into the river or its tributaries in Ridgway and at Johnsonburg on the river five miles above and at St. Marys on the creek eight miles above Ridgway.

Elk creek has its source in the mountains just above St. Marys and crosses down through the two boroughs named to the river, the intervening territory being a mountain valley, steep, rocky and nearly uninhabited. At St. Marys artificial drainage into the creek is contributed by a tannery, chemical works, domestic sewage and by abandoned and operative bituminous coal mines. A tributary from Dagus Mines also receives sewage and mine drainage.

Clarion river heads in the southern part of McKean county. Most of the water shed above Ridgway is in Elk county. The surface consists of precipitous hills and narrow valleys, mostly in the geological horizon of the Kittanning coal measures. The district is well watered by copious springs outcropping high on the mountain sides from which timber has been mostly removed. In consequence, the rain-fall passes off more quickly to the rivers and the low stages of the streams are more frequent and protracted than formerly.

At the present time the channel of the Clarion river at Ridgway is a succession of shallow pools with little water flowing in the bed exposed to view. The bottom is rock full of seams, with occasional gravel deposit, and undoubtedly in places there is a subterranean flow. These conditions render pronounced the presence of pollution of the waters by artificial drainage. There is not much difference in appearance of the river above and below Ridgway now. At Johnsonburg, two paper mills, a sulphite mill, and a tannery drain large quantities of liquid waste into the stream and above there are other tanneries and large chemical works doing the same.

The solid and dissolved animal matter, acids and spent tan liquors from the tanneries, the acids and tars and wastes from the manufacture of chemicals by the destructive distillation of wood, the mixed acid and highly offensive mineral and organic wastes in dissolved and suspended forms from paper mills and the sulphates of iron and free sulphuric acid from mine operations, in combinations with solutions of alumina from the shales and clays, produce in the stream a mixture in which complex chemical actions are bound to occur, evolving gases readily detectible and frequently in the summer time a pronounced nuisance along the river. These changes produce precipitates evidenced by the color of the stone in the beds of the streams and by numerous deposits. So the waters in the streams entering Ridgway are not suitable for manufacturing purposes. During the present dry weather the water is dark, almost black. It is worse in the river than in the creek.

Various public sewers and a number of private drains contribute to the pollution. It is estimated that about half of the streets are piped with sewers owned by private individuals. Outside privies with earth valuts are also common. There are very few cesspools. With exception of the low lands bordering the river and the creek, the town is built on rising ground with marked slopes and not a few of the dwellings areon the hillsides. The earth cover is porous and a few feet below the surface broken seamy rock is encountered and often a hardpan, clayey in nature. Partway down the hillsides, springs crop out. Some of them are near the flats and others but a little way up the hill, and still others are above all dwellings. Earth privy vaults, under these conditions, could saturate the ground, which pollution in wet weather might be carried along the surface or underground on top of the rock or hardpan to the spring at the lower elevation and thus contaminate the spring and injure the life or health of those drinking the water taken therefrom.

The municipality owns and operates the water works system. It comprises a small dam on Gallagher Run, intake filter, concrete storage reservoir, gravity supply to the town, a pumping station and drilled wells in the borough on the flats and the distributing mains in the streets.

Gallagher Run is a tributary of Elk creek. It rises in the hills to the southeast of the borough and flows down a steep channel and through the borough, entering the creek near its mouth. The water shed is hilly and uninhabited with the exception of two farm houses, so it is reported. Its area is said to be one and three-tenths square miles in extent. The dam is a small dilapidated affair, its capacity being less than a day's consumption for the town. The intake filter is a short distance below the dam. It is composed of a concrete wall built across the run, back-filled with stone and gravel to the top thereof. The supply main is inserted in this gravel. The water is supposed to be filtered in this manner and then be conveyed to the concrete storage reservoir. This structure is circular in form, covered, seventy feet in diameter and twelve feet deep to the flow line. There is an eight inch overflow pipe provided and a delivery main. The plans show both to be eight inches in diameter. High water in this basin is elevation sixteen hundred and four and one-half above mean sea level. The floor of the pump house in the town is two hundred and forty-nine and seven-tenths feet lower. At the present time Gallagher Run is dry. There is no water in the dam. Wells have been driven above it on the water shed in a futile attempt to secure flowing water from the ground. The dam and the pipes in the streets of the borough were built about the year eighteen hundred and ninety. The source proving inadequate, about the year nineteen hundred and two the concrete reservoir was constructed and the pumping station and drilled wells.

At the present time all of the public water supply is secured from these drilled wells. They comprise two lines of eight inch pipes sunk in holes drilled to a depth of from fifty-two to ninety-three feet, so it is variously reported. The

water bearing stratum is a sandstone. A ten inch casing contains the eight inch pipe and each casing was supposed to have been driven down securely into the rock to prevent surface contamination. There are two pumping engines directly connected to and driven by gas engines, each capable of raising three hundred and seventy-five thousand gallons daily. It is estimated that the present consumption is five hundred thousand gallons per twenty-four hours. Pumping is continuous. The ground water is forced into the street main system, any surplus going into the Gallagher Run concrete reservoir.

The quality of the water thus furnished is not satisfactory to the consumers. It is hard, contains iron and is not well adapted to boiler uses. There is a public suspicion that the sanitary quality of the drilled well supply is below standard. A forty-two inch storm drain, receiving considerable sewage, passes close to the end of the pump house and on about the same level but slightly lower than the engine room floor. For drainage there is a pipe with a valve on it leading from said floor to said drain. The valve is necessary to prevent the drain from overflowing into the engine room during wet weather. The casing around the wells is partly open at the top close to the floor, so that any serious overflow of the sewer might pass down the casing into the wells and pollute the town's supply. The station is located on Center street at the Pennsylvania Railroad and distant about four hundred feet from the river. The ground is flat here. Until within a few days the hospital sewer and the forty-two inch drain or natural water course conveying sewage emptied into a pool at the railroad opposite the pump house and distant from the wells possibly forty feet. From here in wet weather the sewage is washed in a ditch over flat meadow land to the river, but during dry weather, such as now prevails, the sewage does not flow but merely soaks into the ground over quite an area grown up with bushes and weeds which retard evaporation, and thus menace the purity of the borough supply.

There is a forty foot drilled well eighty feet distant from the pump house which is used to furnish water for industrial purposes to the local electric light plant. At times water cannot be secured in said well unless the borough pumps be slowed down, so it is reported. If this be true, there is a connection which indicates that the borough pumps might draw sufficient quantities of water from the ground to pull on the surface waters along the ditch and the meadow.

In the spring of the year nineteen hundred and four, there was a typhoid fever epidemic in Ridgway and on April ninth, fifty-four cases had been reported. Samples of water collected on that date from Gallagher Run Reservoir and from the pump house wells showed the former to be uncontaminated but sewage organisms were present in large numbers in the latter water. The pumps had been operated from ten to twenty days prior to the outbreak of fever and again during it. It was concluded that the majority of typhoid cases occurred in dwellings supplied with the borough water. So the pumping system was condemned.

The borough authorities have, within the last ten days, connected the hospital sewer with the main outfall sewer of the borough system, but the water course still continues to receive sewage from numerous private sewers and overhanging privies along its banks. Whether the present typhoid epidemic which has already totalled in the neighborhood of two hundred cases, may be attributed in any degree to the borough's ground water supply, has not yet been determined. Nevertheless, the decisive conclusion can be immediately reached that the location of the pump house and wells on the flats at the foot of the town and in the valley of the stream whose waters are highly polluted is altogether bad and decidedly objectionable from a topographical standpoint and from the sanitary point of view, and, therefore, should be condemned regardless of what bacteriological tests might show as to the quality of the water at the particular time of sampling.

The population now using the public supply is reported by the borough to be in the neighborhood of six thousand people. It is said that a distributing main is laid in every street in the town, but this has not been confirmed by the Department for the reason that the municipal authorities have not yet filed plans of the system, as required by law. However, there are about one thousand connections, which substantiates the statement that about all of the inhabitants are furnished with the public supply.

Many of these people, so supplied, obtain their drinking water from semi-public springs. Notable examples are the County spring, supplying the court house and jail and the public fountain in the square in the central part of the borough; the Hyde Spring; the Powell Spring; the Hospital Spring; the Allenhurst Avenue Spring; the Sheehan Spring and the Railroad Spring, all in Ward One; the Depot, the Russel and the Dynamo Company Springs, in Ward Three and a group of four springs in Ward and Ridgway Township. There are numerous smaller outcroppings in use, some of them being in the cellars of dwellings. There are possibly a dozen dug wells, between thirty and forty springs and possibly twenty-five individual bored or drilled wells scattered about the borough.

The Hyde Spring is on the hillside away from all habitation and sources of pollution. It belongs to the Hyde estate and the water therefrom is collected in a tank and piped into town and furnished to a limited number of families, about twenty in all.

The Powell Spring is on the hill above all buildings. It is walled up and housed over and the water is piped to the Powell Residence in the centre of the borough. By permission one or more other residences may be supplied. A few people carry water from this spring to their dwellings. Buckets are filled from the overflow pipe.

The Hospital Spring is on the hillside; it is walled up and covered over and used exclusively by the Hospital. However, there are buildings above it on the hill.

The Allenhurst Avenue Spring outcrops in the rock at the foot of the hill on the flat near Elk creek. Formerly the head race leading from the dam across the creek and furnishing water to run the planing mill in the centre of the borough distant about a block from Main street occupied the place of the ditch now receiving the flow from this spring. The race was condemned as a nuisance about ten years ago and filled in. There are houses on the flats in the vicinity of the spring whose occupants drink therefrom. The sources of pollution are from the dwellings on the hillside above. Kitchen garbage is deposited on the banks of the public road directly above the spring. In the extension of Allenhurst Avenue there is a well beaten path following the foot of the hillside northerly to near the bank of the creek opposite the plow works, where there is a copious spring. Individuals carry water in buckets long distance from this place, possibly because there is no apparent source of pollution above it on the hills.

The Sheehan Spring is well up on the hillside in the south-western part of Ward One. The water is piped to a small box reservoir from which, so it is reported, the water is led by a pipe to some of the dwellings in the vicinity. Topographical evidence would not condemn this source.

At the Pennsylvania Railroad location, near the one mile post down stream from the depot, there is a spring issuing from the rock. The only observed source of pollution, if this could be considered as such, is possible drainage from the public road high above on the precipitous bluff. The water flows from this spring through a pipe into the railroad gutter so that people who come here with buckets to fill the same without danger of polluting the spring itself.

The County Spring, also known as the Earley Spring, is located just above the central residence district of the town, where the slope of the ground becomes quite precipitous. Formerly it was the beginning of a natural water course which went down through what is now the centre and business district of the borough to the creek, but this has long since been covered over and substituted by underground conduits, either of pipe, stone, concrete or wood, as the case may be. The spring has been walled up and housed over and dedicated for county uses. Immediatly above it on the steep slopes are ten houses occupied, and several public thoroughfares. The water is used at the jail and in the county offices. At the fountain in the square people from all over the borough, and elsewhere, may quench their thirst. The spring house is conveniently located in a well built up neighborhood and its waters are carried in buckets into the homes of hundreds of the citizens.

During the typhoid epidemic of the spring of nineteen hundred and four, tests of water collected from the County Spring showed the presence of sewage organisms and the spring was condemned. It is known that when wells were drilled to supply water to the houses located on the hillside above the spring, said drilling was coincident with the cloudy appearance of the water in the County Spring. Also that when the drilling ceased, the spring water cleared up. Now sink water and slops from the four houses immediately above the County Spring are emptied into the hopers and thence through a sewer extending through the lots in the rear of these houses and within two or three rods of the County Spring to a public sewer. This drain at the house nearest the spring has been recently uncovered and found to be in a faulty condition. The joints were loose and uncemented and the sewage leached out into the surrounding ground. Possibly and probably the whole line of this drain is in a similar condition. This in itself would menace and be likely to contaminate the spring. Besides, at three of the four houses there are earth vault privies. At one of these three houses there are earth vault privies. At one of these three houses a man was sick with typhoid fever the early part of the summer of the current year and attention has been directed to this fact as a possible origin of the epidemic. Infection from the privy vault in the earth which was full to overflowing might have been washed over the surface of the ground to the County Spring, or it might be able to find a subterranean passage. Still further, the drain from the property could have transmitted the infection and deposited it in the ground in proximity to and above this spring, from whence it could reach said spring. All topographical and bacteriological evidence now in possession of the Department calls for the absolute condemnation and permanent abandonment of this spring as a source of drinking water.

The Depot Spring is on the side of the road at the foot of the hill on whose slope a few dwellings are now located, and where others will be erected in the future. The topographical evidence is enough to demand an abandonment of this source of drinking water.

The spring on the flats at the Russell Car and Snow Plow Works has been walled up and covered over in an attempt to protect it from all surface drainage. The flow seems to be quite copious. The neighborhood, locally known as

Hyde's Hill, resort to this place for drinking water. Recently it has been piped out so that buckets may be filled from the stream issuing from the pipe. The source of this water is probably from the porous strata in the hills on whose sides are the streets and dwellings occupied by the employes of the Snow Plow Works and the Machine Company. In the district earth privy vaults are used and kitchen drainage and slops may be seen in the street gutters. It would not be strange if the ground should in time become saturated and the pollutions finally reach the spring. How soon this may occur no one can say with authority. The topographical conditions are suspicious. There is a risk in drinking the water, which prudence dictates should not be assumed.

In the northern part of the borough there is a neighborhood spring used extensively by the people and the employes in the dynamo works and the brick yard. In September of the year eighteen hundred and ninety-five, typhoid fever broke out in the vicinity and among the mechanics and laborers in the McEwan Manufacturing Company's works, now the Dynamo Plant. The disease was attributed to the spring water, the spring was condemned, walled up and surface water diverted away from it.

At that time the Gallagher Run reservoir supply was supplemented in dry weather by water drawn from shallow wells driven on the banks of the river at the said McEwan or Dynamo Works. The spring was nearly at the foot of the steep hill and immediately above it were the dwellings and public roads.

During the year eighteen hundred and ninety-seven, cases continued to appear. Samples of water collected from the Dynamo Works spring and from the Gallagher reservoir and from a tap in a dwelling in town where were two typhoid cases, showed the presence of sewage organisms. It was reported that all of the cases occurred in houses supplied with the public water and the State Board of Health condemned the shallow well supply and the Dynamo Spring. Also the recommendation was made that a new water supply should be secured from an uninhabited water shed. During March of the current year, ten men employed in the Dynamo Works and drinking the spring water which is piped to said works, were taken sick with typhoid fever. The company has since acquired the exclusive right to the spring, arched it over and securely protected it from surface contamination and provided a pipe overflow from which any one may obtain water.

At least one of the group of four springs in West Ridgway rises below dwellings on the roadside where polluting matter may reach it.

The Ridgway Tannery uses water from a seventy foot drilled well on the property for manufacturing and drinking purposes.

The Eagle Valley Tannery also has a system of driven wells on the banks of the river in use for manufacturing and drinking purposes.

The shallow wells at the Dynamo Company's plant furnish the water required there for manufacturing. Some of it may be drunk by employes. There is an emergency connection between the Eagle Valley and the Ridgway Dynamo and Engine Company's pipes and the borough system by means of which either one or both of these companies can pump the shallow well water into the town mains. The water is hard and not satisfactory for boiler uses. It ought not to be used without purification for drinking purposes.

Both the Plow Works and the Ridgway Machine Company use drilled wells for manufacturing. The borough furnishes some water for the latter plant.

It appears that on the twenty-second day of July, nineteen hundred and seven, at a borough election held therefor, the citizens authorized an increase of public indebtedness in the aggregate sum of thirty-seven thousand dollars for the improvement and extension of the water works system to meet the needs of all the consumers and the rapid increase in population of the borough. The ordinance under which the electors voted specifies "that a source of an abundant supply of mountain stream water suitable for domestic purposes, be secured, the necessary dams and reservoirs be constructed, suitable pumps be installed and pipe lines be laid to furnish to the consumers of water in the borough of Ridgway an adequate supply of the same at all times. Also that the lines of water pipe be extended from time to time as may become necessary in order to meet the demands of consumption."

There is a fund on hand which increases the sum which the borough may expend for water works to the total of about fifty thousand dollars.

The petitioners represent that the borough wishes to abandon its present pumping and drilled well supply and to obtain a new source from Big Mill Creek by means of an intake dam, pumping station, mechanical filter, storage reservoir and gravity supply main to town, connecting with the existing distributing system.

Detail plans have not yet been prepared. Owing to the emergency, the intention is to put a large force of men at work laying the new force and supply main and installing the pumps in order that the borough may furnish pure water at the earliest possible moment.

Big Mill Creek is a mountain stream rising in Jones township and flowing directly south, a distance of about fourteen miles to the Clarion river, which it enters about two miles below Ridgway. The head waters are twelve miles above Ridgway and seven miles above Johnsonburg and the stream lies to the west of these places. The water-shed is narrow with precipitous sides. The

valley is deep, the bed of the stream stony and rather porous and the territory is unoccupied except by a lumbering camp and two farm houses. The heavy timber has been cut off and now the beach, birch and maple wood is being taken out for use at Johnsonburg in the manufacture of paper. This operation will occupy five years it is estimated, and from seventy-five to two hundred men are constantly engaged. There is a camp on the watershed. The wood is taken out by a tramway.

The site of the proposed intake dam and pump house is opposite Ridgway and about two miles therefrom. The area of the watershed here is thirty square miles and the flow of the stream about one and one-half million gallons per twenty-four hours. This is estimated. It is believed that were a concrete dam to be extended across the creek and down to bed rock, that the minimum flow would exceed this amount owing to the numerous springs on the drainage area above, which yield water the year round. When the flow proves to be inadequate for the town's supply the intake is to be enlarged to a storage dam of a size ample to meet the needs of the time.

For a nominal sum the borough can purchase a strip of land six rods in width, three rods in width on each side of the centre of Big Mill Creek and each and all of its tributaries from the point where said creek crosses the north line of Warrant Number three thousand two hundred and fifty-four in Jones township southerly to the southeast corner of Warrant Number four thousand eight hundred and sixty-five in Ridgway township, a total distance of about seven miles. Therefore, municipality may, if it choose, become a riparian owner in a stream by purchase. There is a dam and mill below the site of the proposed intake. Its use is principally during the wet months of the year when there is ample water for all purposes and plenty to waste. The petitioners believe that there will be no damage to the mill privilege by reason of the diversion of water from the creek in the small amount needed for the supply in Ridgway. However, a waiver of damage should be secured.

The bed of the creek where the eight inch gas line of the Ridgway Light and Heat Company crosses its elevation thirteen hundred and eighty-five, which is thirty feet above the elevation of Main street where the proposed new supply main is to be connected to the present system. Intervening between these points is a hill two hundred and ninety-five feet higher than the creek and distant therefrom four thousand feet. The pumps will raise the water to this summit where it is proposed to build a storage reservoir holding seven days supply of water, also the filter plant. From this reservoir the gravity main will be eighty-five hundred feet long to the town. Details of the filter plant, storage reservoir, intake and pumping station will be submitted for state approval as soon as plans are prepared.

It is proposed to install two new pumping engines each seven hundred and fifty thousands gallons daily capacity and also to set up in the new station the old pumping engines.

This supply is to be used whenever the Gallagher Run source is insufficient, which for the present will be occasionally in winter and always in the summer season.

The petitioners state that consideration has been given to a plan for a supply from Island Run, but that council does not approve of it. Nevertheless, in event the State should deem this supply preferable to Big Mill Creek, then the borough desires the State to approve of the Island Run supply.

It appears that this run lies to the south of Ridgway and a part of the northern boundary of its water shed forms the southern boundary of the Gallagher Run water shed. The drainage area is approximately three square miles or a little over and is uninhabited. The mouth of the run is three miles down the river from the Pennsylvania Depot in Ridgway.

It is at once apparent that if Gallagher Run water shed fails to yield a flow in dry weather, an area three times larger would not be ample without storage to supply a town of Ridgway's present size. The evaporation from a body of water is about equal to the rainfall thereon and hence too much surface storage may waste the water collected. Some water sheds are not adapted for storage purposes. Where all conditions are favorable, the highest development is equivalent on an average to the yield of a little over half a million gallons daily per square mile of water shed. So if the conditions be favorable on Island Run, the supply would not be much in excess of a draught of one and a half million gallons daily over the longest period of drought observed to have occurred in the Northern States. This consideration alone renders the Island Run project questionable.

The flow at the present time, though small, in appearance equals the quality of Big Mill creek water and the chemical tests are corroborative. While measurements may show that some storage is at once necessary on Mill Creek, there is no doubt about the necessity for larger storage on Island Run. Dams of any size whatever are usually constructed for a long period, at least equal to the terms of the bonds. In this instance the term would be thirty years. The cost of such a structure if now erected on Island Run, together with the cost of grubbing and cleaning the basin (which is now a swamp covered with thick underbrush) of all organic and objectionable matter and the fixing of the sides

to obviate shallow flowage in order to assure a minimum deterioration in the water stored, would be in excess of the amount which the borough can afford to expend at this time.

Furthermore, all water would have to be pumped about sixty feet in excess of the height of pumping required for the Mill Creek source.

The latter supply comes from an area extensive enough with storage to supply a city of fifty thousand inhabitants. It is a mile nearer the borough, its flow is available to supply the town at once, the intake, pumping station filter and storage basin and supply main should be built for the sum available therefor and these facilities can be paid out and built in such a way as to admit of extensions to meet future demands without the undoing of any of the contemplated immediate constructions. It seems clearly evident that economy and efficiency may be best secured by resorting to Mill Creek. It is always an asset for a town to possess an abundant source of water supply, especially where the municipality desires to promote the industrial development of the community.

However, there is one very important consideration respecting the purity of the Mill Creek source. On its water shed wood-cutting operations will be maintained for years. Such operations and kindred ones are greater menaces to a water supply than permanent dwellings. The sanitary conditions of the latter are more easily regulated. The customs of the woodsmen are most difficult to supervise and control. Any one of these employes is more likely to infect a public water supply than several permanent residents. Hence the filtration of the creek waters in a plant of modern design is essential. Without it the public health would not be safeguarded. The proposed mechanical filters should be adequate in design. It is not clear that their location on the hill is in the interests of efficiency. Probably a better plan would be to have the filter and pumping plant located on the banks of the stream where both could be operated by one man. However, this can be determined when the detail plans shall have been submitted.

The watershed of Gallagher Run should be occasionally patrolled, sanitary inspections should be made at all dwellings and buildings thereon and monthly reports thereof submitted to the State Department of Health. Prompt action should be taken for the abatement of any nuisance or menace discovered. A fence should be constructed around the open reservoir to keep cattle out of the water. The borough should find it desirable to abandon altogether the Gallagher Run supply as soon as the finance may permit this expedient. Probably, upon the introduction of filtered water in the town, the consumption will be increased and the revenues proportionately. It is possible that the industries may demand the water in event of the new supply proving to be of superior quality for boiler purposes.

A patrol should be maintained on Mill Creek water shed, all dwellings and camps should be inspected and a monthly report thereof submitted to the State Department. Sanitary facilities and portable privies of approved type should be provided at all camps and lumber operations and the operators themselves should also cause to be patrolled all such camps and to submit monthly reports thereof. Blank mailing cards for the prompt notification of any communicable disease should be furnished by the borough to each and every family permanently resident, and also to every man or set of men emyployed on said water shed, to be returned to the borough forthwith at the onset of any such disease. And the borough should at once notify the State Department of Health and take precautions to prevent infection of any surface waters. The Commissioner of Health, in issuing rules and regulations for the sanitary protection of the water shed, might specify that prompt reports of the existence of any communicable disease shall be made to the borough.

The borough's existing driven well system must be abandoned absolutely and the wells closed up and all pipes disconnected therewith immediately upon the securing of a new source of supply. At such time all other connections with the public system by means of which well water may be pumped into the town mains shall be absolutely severed. Such sources are dangerous and should be abandoned for drinking purposes at the industrial plant. The filtered town supply should be introduced in all the works and supplied for drinking purposes.

The following springs are condemned and should be abandoned as sources of drinking water as soon as a filtered municipal supply is available, and meantime all drinking water from whatsoever source should be boiled; Dynamo Spring, Depot, Russell, Allenhurst avenue, County Hospital and the Roadside Spring at the forks of two public highways in West Ridgway. There are other private springs, besides drilled and dug wells, in the town are equally suspicious. These will be examined and tested by the State, and, if found objectionable, the Commissioner of Health will advise their abandonment.

The County Commissioners and the borough authorities should co-operate relative to the early substitution of the new public supply in the Court House, jail and public fountain in place of the County Spring, condemned. The local authorities should also bring about at the earliest practicable moment, the discontinuance of the use of any drinking water in the manufactories except that supplied by the borough from the new source, or some equally good water.

House connections with sewers, wherever the dwellings are in proximity to wells or springs, should be compulsory.

From the standpoint of public health, both the Island Run and the Big Mill Creek projects are approved. The borough council has expressed a preference and it shall assume the responsibility for the final choice.

It has been determined that the proposed source of supply from Big Mill Creek will not be prejudicial to public health under certain conditions, and a permit is hereby and herein granted therefor and for the extension of the street pipe system, under the following conditions and stipulations:

FIRST: That the intake dam shall be located where it may be advantageously and economically enlarged to a storage dam and equipped to meet future borough demands and a topographical plan of the basin thus to be formed, and details of the present intake dam, together with the pumping station, well, piping, valves and engine lay-out, shall be prepared and submitted to the Commissioner of Health for approval before construction of this work shall be undertaken.

SECOND: Detailed plans of the new storage reservoir on the hill and of the filter plant shall be submitted to the Commissioner of Health and these structures shall not be built until the plans thereof have been approved by the Commissioner of Health. Particular attention must be paid to the design of the filter plant. It must be operated whenever the pumps are operated and attain a high degree of efficiency. The borough should employ some qualified expert to select the best point for the erection of the filter plant to design the details. This will prove true economy.

THIRD: This permit is issued under the express stipulation that a plan of the borough showing elevation of the streets at intersections, with all water pipes, their sizes, location of valves and hydrants, and connecting mains to the Gallagher Run covered reservoir and dam shall be filed in the State Department of Health on or before September tenth, one thousand nine hundred and seven.

FOURTH: The borough shall maintain a patrol of the Gallagher Run and Mill Creek water-sheds, observe whether the rules and regulations for the sanitary protection of the waters to be supplied to the borough from Big Mill Creek and Gallagher Run are being complied with and promptly report any violation of nuisance and menace. It shall inform the Commissioner of Health of the name and address of permanent residents on the water-shed and of men engaged in lumber, wood-cutting or other operations on the water-shed and shall furnish such residents, men, operators and workmen with blank morbidity cards for the prompt reporting of the presence of any communicable disease. Once monthly, in case no communicable disease has occurred, on a blank mailing card to be furnished by the borough for the purpose, such residents, men and operators shall return a positive statement to this effect. As soon as a communicable disease appears, the patrolman shall investigate and report to the State Health Department.

FIFTH: At all camps and lumber operations, the Commissioner of Health will require that proper sanitaries and portable privies shall be provided, and it shall be the duty of the patrolman to see that such facilities are afforded and that they are properly used and emptied.

SIXTH: The patrol and system of morbidity report shall be installed and in successful operation on or before the date that the water from Big Mill Creek is first introduced into the town. The filter plant shall be erected and put in commission during the current year, so that the plans thereof must be submitted for approval without delay, unless it can be satisfactorily shown that it is not necessary to have the filter ready for use until the beginning of the dry season of the succeeding year.

SEVENTH: The borough shall immediately disconnect the distributing system with the existing wells at the pumping station and at the Eagle Valley works and at the Dynamo Company's works, and anywhere else, if there be any such connections, and thereafter, upon the introduction of the new supply into town, this and the Gallagher Run supply shall be the only sources used in the public system and the latter shall be discontinued as soon as practicable.

EIGHTH: If the borough council shall select the Island Run supply, then before any construction work done, detail plans thereof must be submitted to and approved by the Commissioner of Health.

The various manufacturing companies hereinbefore mentioned will be notified of the danger of furnishing for drinking water any ground water source and advised that the new filtered public supply, when available, be introduced into said works.

The special attention of the local authorities is called to the condemnation of the springs hereinbefore specified and to the advice relative to their abandonment and to other suggestions hereinbefore contained.

The following order relative to the sanitary protection of the proposed supply has this day been issued:

COMMONWEALTH OF PENNSYLVANIA,

DEPARTMENT OF HEALTH,

AN ORDER ISSUED BY THE COMMISSIONER OF HEALTH OF THE STATE OF PENNSYLVANIA FOR THE SANITARY PROTECTION OF THE WATER USED BY THE BOROUGH OF RIDGWAY, ELK COUNTY, FOR THE SUPPLY OF WATER TO THE PUBLIC IN SAID BOROUGH.

Section 1. No cesspool, privy, or other place for the reception, deposits, or storage of human excrement, and no urinal or water-closet, shall be located, constructed or maintained within 50 feet of the high water mark of any reservoir, stream, ditch, water course, or other open waters used by the borough of Ridgway as a source, or for the conveyance, storage or distribution of the water supply of said borough, or within 50 feet of the high water mark of any reservoir, stream, ditch, water course, or other open waters, the water of which flows directly or ultimately into any waters so used by the borough of Ridgway.

Section 2. No human excrement shall be deposited or discharged in or into any reservoir, stream, ditch, water course, or other open waters, used either directly or indirectly by the borough of Ridgway for the supply of water to the public in said borough; and no human excrement shall be kept in, deposited, or discharged in or into any cess-pool, privy, or other receptacle situated within 250 feet of the high water mark of any open waters so used directly or indirectly by the borough of Ridgway unless such cess-pool, privy, or receptacle is so contructed that no portion of its contents can escape or be washed into any such waters.

Section 3. No human excrement, or compost containing human excrement, or contents of any privy, or cesspool or sewer or other receptacle for the reception or storage of human excrement, shall be deposited or discharged upon or into the ground at any place from which any such excrement, compost or contents, or particles thereof, any flow or be washed or carried into any reservoir, stream, ditch, water course, or other open waters used by the borough of Ridgway as a source or for the conveyance, storage or distribution of the water supply of said borough, or into any of such waters of the State, the water of which flows directly or ultimately into any waters so used by the borough of Ridgway.

Section 4. No house slops, sink wastes, water which has been used for washing or cooking, or other polluted water, shall be discharged directly or indirectly into any reservoir, stream, ditch, water course, or other open waters used by the borough of Ridgway as a source, or for the conveyance, storage or distribution of the water supply of said borough, or into any such waters of the State, the water of which flows directly or ultimately into any waters so used by the said borough; no house slops, sink water, water which has been used for washing or cooking, or other polluted water, shall be discharged into the ground within 50 feet of the high water mark of any open waters so used by the said borough, or of any open waters flowing as aforesaid into the waters so used by the said borough, and not then, unless such discharge into the ground be so arranged that no portion of it can escape to the surface of the ground and be washed into any such waters.

Section 5. No garbage, manure or putrescible matter, whatsoever, shall be put into any reservoir, stream, ditch, water course, or other open waters used by the borough of Ridgway as a source or for the conveyance, storage or distribution of the water supply of the borough of Ridgway, or into any such waters of the State, the water of which flows directly or ultimately into any waters so used by the said borough; and no garbage, manure or putrescible matter whatsoever, shall, except in the cultivation and use of the soil in the ordinary method of agriculture, be put upon the ground within 250 feet of the high water mark of any open waters so used by the said borough, or of any open waters indirectly so used by the said borough, nor on said ground beyond said limits, unless precautions are taken that prevent any portion of such matter to escape or be washed into any such waters.

Section 6. No stable, pig-sty, hen-house, barn-yard, hog-yard, hitching or standing place for horses, cattle or other animals, or other places where animal manure is deposited or accumulated, shall be located, constructed or maintained, any part of which is within 50 feet of the high water mark of any reservoir, stream, ditch, water course, or other open waters used by the borough of Ridgway as a source, or for the conveyance, storage or distribution of the water supply for the said borough, or the waters of the State, the waters of which flow directly or ultimately into any waters so used by the said borough, and no stable, or other place as above enumerated, shall be located, constricted or maintained on any ground, the surface drainage of which is

either directly or indirectly into the aforesaid waters so used by the said borough, unless suitable and adequate provisions are made to prevent any manure or other polluted matter from flowing or washing into such open waters.

Section 7. No manufacturing refuse, or waster products, or polluting liquid, or other substance of a nature poisonous either to human beings or animals, or other putrescible organic matter, whatsoever, shall be discharged, directly or indirectly, into or at any place from which it may flow, or be washed or carried into any of the open waters of the State, used by the borough of Ridgway as a source of supply to the public, or for the conveyance, storage or distribution of the water supply of the said borough.

Issued September 2nd, 1907, and to remain in force until further order.

SAMUEL G. DIXON,
Commissioner of Health.

Copies of these orders will be printed on cloth and furnished by the Department to the borough. The borough shall post the same on the water-sheds at all occupied estates, camps, along public highways, at stream crossings and along the banks and paths frequented by hunters and fishermen.

Harrisburg, Pa., September 5th, 1907.

SWATARA TOWNSHIP, DAUPHIN COUNTY.

Rutherford Heights Water Supply Company.

This application was made by the Rutherford Heights Water Company of Swatara township, Dauphin county, and is for permission to install a system of water works for the supply of water to the public within the township of Swatara.

It appears that in the proposed water district and adjacent thereto there are existing public water works owned by private corporations.

Swatara township lies immediately to the east of the southern part of the city of Harrisburg and to the east of all of Steelton borough. And below or south of said borough it extends along the east bank of the Susquehanna River for nearly three miles. It is bounded on the north by Susquehanna township—which township forms the easterly boundary of the the upper portion of Harrisburg—and by Lower Paxton township, on the east by Swatara Creek and a tributary named Beaver Creek, and on the south by Lower Swatara township. The latter township comprises all the land in the forks between Swatara Creek and the Susquehanna River, except a small tract at the confluence of these two streams incorporated as the borough of Middletown. This borough and that of Penbrook in Susquehanna township just north of the Swatara township line, are the only incorporated municipalities within the boundaries of the four said townships. But on the Swatara Creek opposite Middletown is the borough of Royalton and eight miles up stream on the Swatara Creek opposite the east end of Swatara township, and opposite where Beaver Creek enters the Swatara Creek is the borough of Hummelstown.

The latter boroughs and Middletown have public water works owned by private water companies and the source of supply at Hummelstown is the creek and at the two other places the creek for emergencies. The supply is unfiltered but a purification plant is contemplated and plans for approval are already before the Department relative to the Hummelstown system.

In Swatara township in nineteen hundred, there was a population of four thousand eight hundred and sixteen people. Now this is considerably increased and a future growth is assured. On the hills back of Steelton in the township, are the suburban settlements of Churchville, (P. O. Oberlin), Enhaut, locally known as Highland, and New Benton, the present populations being about one thousand three hundred and one thousand and four hundred respectively.

In Swatara township contiguous to the city of Harrisburg is a rapidly growing district known as the village of Eastmere, population in the vicinity of one thousand two hundred, and beyond, the settlement of Paxtang, population about two hundred. Outside of these settlements, the rural population in the township is approximately one thousand. The territory is largely under cultivation.

Penbrook borough in nineteen hundred had a population of eight hundred and sixty-four. Its streets are numbered in anticipation of the intervening land between the borough and the city of Harrisburg becoming built up and the streets therein numerically designated from First street in Harrisburg easterly. The Penbrook Water Company was incorporated in August one thousand nine hundred and two for the purpose of furnishing water to the public in the borough of Penbrook, but up to the present time no works have been installed there.

In one thousand eight hundred and ninety-eight a charter was granted to the Swatara Water Company to supply water to the public in Swatara and Lower Swatara townships and in territory adjacent thereto. So far as has been learned no work was done or water furnished by the company.

In one thousand eight hundred and ninety-five a charter was granted to the Paxtang Water Company for the purpose of supplying water to the public at the village of Paxtang and adjacent thereto. In one thousand nine hundred and six the name of this company was officially changed to the Paxtang Consolidated Water Company. The village consists of about forty dwellings. The water works comprise a drilled well in the outskirts near the village cemetery, a small gas pumping engine, two inch wrought iron force main, wooden storage tank and supply mains in the village. The tank is twelve feet in diameter and seven feet high, rests in a masonry foundation about six feet from the ground and is roofed over. The company has not submitted plans nor a report of its system to the State Department of Health so that the Department is without information as to the extent to which this water company supplies the public. On the day of the inspection the works were not in operation. The citizens were obtaining their water from individual sources or from Rutherford Spring located at the entrance to a trolley resort known as Paxtang Park and operated by the Central Pennsylvania Traction Company.

In one thousand eight hundred and ninety-nine the Eastmere Water Company was chartered for the purpose of supplying water to the public at the village of East End (Eastmere), in Swatara township and adjacent thereto. The village as previously stated, begins at the city line, and extends on both sides of Derry street easterly. At present there are about two hundred and fifty houses in the settlement. The said company purchases its supply of water from the Harrisburg municipal plant. The city charges a meter rate, the measurement being made at the city line. The Eastmere Water Company has not complied with the law requiring plans and reports of its water works system to be filed in the State Department of Health. It is reported that said company has extended its water works system during the current year. This has been done without application to or approval by the Commissioner of Health. The extension is reported to consist of a main pipe line easterly from Twenty-second street passing through Paxtang village three and one-fourth miles to Rutherford station on the Philadelphia and Reading Railroad. At Twenty-second street on July eleventh, one of the Department's engineers witnessed the making of a connection between a six inch main in Derry street and a twelve inch main apparently the beginning of the new line up Derry street. It is also reported that new pipes have been laid in Paxtang village and connected to the new Derry street main.

The Hummelstown Consolidated Water Company has not filed plans, surveys and reports of the Hummelstown system, nor did its predecessor, chartered in one thousand eight hundred and eighty-seven and existing as the Hummelstown Water Company up to April ninth, one thousand nine hundred and seven, when the name was changed. But a plan of the water-shed and of one of the company's real estate holdings at the intake were filed in one thousand nine hundred and five.

Neither have plans and a report of the water works system at Middletown been filed. The Middletown and Swatara Consolidated Water Company of Middletown supplies water to the public in Middletown and Royalton boroughs.

The Department is informed that Mr. David Gring maintaining an office in Harrisburg controls or is concerned in the Penbrook, Paxtang, Middletown and Hummelstown Water Companies and also in the Rutherford Heights Water Supply Company whose application is under consideration. Mr. S. F. Dunkle is president of the latter company and also of the Eastmere Water Company.

The petitioners represent that the Rutherford Heights Water Supply Company desires to construct a system of water works for the supply of water to the public in the village of Rutherford Heights, Oberlin, Enhaut, New Benton, all situated in Swatara township, as well as to supply the public in other parts of said township through which the company's pipe lines may pass in reaching these villages, or from which sufficient revenue can be secured to warrant the laying of additional pipe lines.

Evidently the different water company systems in Swatara township and vicinity may ultimately be connected one with the other if this should be found desirable.

The source of supply from which the Rutherford Heights Water Supply Company purposes to take water is the Swatara Creek and the charter provides that the company shall confine its source to said creek, at the place shown on the plan submitted by applicants and on file in the office of the State Water Supply Commission, dated March thirteenth, nineteen hundred and seven. This place is indicated on said plan as being at a road crossing of the stream in Lower Swatara township near the Swatara township line and one mile below Hummelstown borough.

The Big Swatara rises in the Broad Mountains in Schuylkill county—in the Lorberry and Lykens Valley districts of the southern anthracite coal fields where there are four collieries and two washeries in operation—and take a general south-westerly course through the south-western part of Schuylkill county and thence through Lebanon and Dauphin counties to the Susquehanna river at Middletown, traversing all told a distance of about sixty miles, the upper part of which is in the mountains but the lower three-quarters being in

the open, rolling and celebrated Lebanon Valley. The creek emerges from the mountains into the undulating plains at Swatara Gap in Blue Mountains in the northern part of Lebanon county, forty miles above the Susquehanna River. Above the gap on the water-shed in Schuylkill county are the boroughs of Tremont and Pine Grove and the village of Suedburg, four, ten and sixteen miles respectively below the head waters. Ten miles below Suedburg in Lebanon county are the forks of the Big and Little Swatara and the borough of Jonestown. Twenty-four miles further on is the borough of Hummelstown. On the entire water-shed stated to comprise five hundred and sixty-two square miles of which five hundred and eight are above Hummelstown not including the Beaver Creek, there is one city, six boroughs, and all or parts of thirty townships, totalling a population of approximately seventy-five thousand people.

While the Upper Big Swatara waters are acid because of mine drainage, the stream is augmented by many copious springs and mountain runs whose volumes in the aggregate are sufficient to neutralize the acidity all or considerable of the time. The Little Swatara, which rises in Blue Mountains in Berks county and drains about one hundred square miles mostly in slate but partly in limestone formation and under high cultivation, discharges alkaline waters into the Big Swatara. The Quittapahilla Creek which rises east of Lebanon City and drains that municipality and a limestone belt empties its alkaline and sewage polluted waters into Big Swatara near the Dauphin county line about ten miles above Hummelstown. In consequence the quality of the main stream is variable in the extreme depending upon whether the greater percentage of flow comes from the hard, alkaline and sewage polluted streams or the natural softer waters of the mountain territory. It has been observed to be the fact that the waters at Hummelstown are more or less constantly turbid, sometimes black from coal washings, clayey at all stages and muddy after rain. Still further, some of the tributaries contain sewage. Pathogenic poison from even the most remote borough on the water-shed and from hundreds of individual menaces might be transmitted in the water so quickly that the time lapsing between the entrance of the pollution to the stream and its exit into the Susquehanna River would not be sufficient to permit natural agencies of destruction to kill all disease germs and in consequence they might in virulent form find their way through water works intakes into public distributing pipes and cause sickness and death. Not only does the water of the Big Swatara need preliminary treatment termed sedimentation but it also needs purification by filtration in the approved form in order to render this source a pure and wholesome and satisfactory one for public uses.

The applicants do not intend to effect at this time any purification of the water except that resulting from crib work in the bed of the stream in connection with the proposed intake.

From here the water is to be forced easterly two miles to a distributing reservoir to be located on a hill south of the Philadelphia and Reading Railroad and opposite Rutherford Heights, from whence water is to be supplied by gravity northerly to Rutherford Heights and southwesterly to Oberlin and the other places. Details of the arrangement of the intake, pumping station, of the distributing reservoir, pipe lines, etc., have not been determined, the project being, so far as the Department is informed, in the early stages of development only.

The Philadelphia and Reading Railroad extends from Harrisburg easterly through Swatara township and recently modern and extensive classification freight yards have been built in the vicinity of Rutherford Station. These yards consist of a number of tracks about two and one-half miles long and at one place twenty-three tracks wide. A repair shop, round house, turn tables, offices and other buildings have been provided. Rutherford Heights is a settlement being developed by private enterprise to afford homes for railroad employes. It is located on rising ground along the classification yards. There are eight houses in the settlement now and the present population consists of three families. A large development is anticipated and sewerage and water works facilities are needed. The present water supply consists of driven wells and one spring. The village is readily reached by trolley from Harrisburg as well as by the steam line.

The water supply for locomotive and general yard use but not for drinking purposes, is furnished by the railroad company, the source being Beaver Creek. On the banks of this creek there is a brick pump house, containing two steam pumping engines by means of which the creek water is forced two and one-half miles through a ten inch pipe to three tanks in the freight yards near the round house from which the water is distributed to different points in the yards, to locomotive cranes. Employes obtain drinking water from springs in the vicinity or from adjacent houses. Because the drinking water has to be obtained from a distance and is not convenient, Beaver Creek water is quite liable to be drunk by the railroad men. An abundant and ready supply of drinking water of known quality is needed at the yards.

The villages to be supplied by the applicant company need general fire protection and a safe drinking water. The individual wells, springs and cisterns now there are in danger of ultimate, if not immediate contamination from

careless disposal of excreta and household waste on the ground or into cesspools and privies. This is a general observed fact with respect to growing communities similarly situated. But it does not follow that substitution of unfiltered Swatara Creek water for the present supply in these villages would subserve the interests of public health. In fact the contrary would be likely to prove true.

The local sources may be polluted but the creek is known to be polluted. The drainage of Lebanon city alone would condemn the Swatara as a suitable source.

The petitioners offer one bacterialogical test of the creek water which shows a total of three hundred and thirty-six bacteria per c. c. and one colon. But this single test is not a criterion by which to judge of the purity of the water.

The Hummelstown consumers' complaint about the quality of the public supply furnished in that town is before the Department together with the plans of the Water Company for filters.

The Middletown Board of Health complaint about the quality of the supply furnished to that borough—which source is supposed to be superior to Swatara Creek water—is also before the Department.

The City of Lebanon contemplates taking a part of that city's supply from the Little Swatara Creek but the waters are to be subjected to purification through filtration.

The State could not consistently approve of the proposed supply of the Rutherford Heights Water Supply Company unless the plans included a purification plant. The size of such a plant would necessarily be problematical. The lay-out should be such that the works could be enlarged to advantage from time to time as the extension of the pipe system and the amount of daily consumption made demands upon the system.

Eastmere consumers now have a filtered water furnished by the Harrisburg plant. Should the Eastmere Water Company purchase water of the applicant company, a marked deterioration in quality of water would at once be apparent unless Swatara Creek water were also purified.

It has been determined that the proposed source of supply will not be prejudicial to public health and approval is hereby and herein given to said source and permission is granted to the Rutherford Heights Water Company to install the proposed system of water works under its charter only under the following conditions and stipulations:

FIRST: That before the proposed water works system be constructed and used, detail plans thereof shall be prepared and submitted to and approved by the Commissioner of Health as provided by law, and among other things said plans shall include designs for a water purification plant.

SECOND: The Commissioner of Health shall consider the said detailed plans, and when modified or amended or approved, will stipulate the conditions under which said approval be given for the construction, operation and maintenance of the system for the protection of the public health.

It should prove a paying policy for the company to conform to the requirements of the State Department of Health.

Harrisburg, Pa., July 22, 1907.

SWATARA TOWNSHIP, DAUPHIN COUNTY.

Rutherford Heights Water Supply Company.

This application was made by the Rutherford Heights Water Supply Company of Swatara township and is for approval of a plan for obtaining a source of supply from the Eastmere Water Company.

On July twenty-second, one thousand nine hundred and seven, the Commissioner of Health issued a permit to said Rutherford Heights Water Supply Company, which among other things specified "that before the proposed water works system be constructed and used, detail plans thereof shall be prepared and submitted to and approved by the Commissioner of Health as provided by law, and among other things said plans shall include designs for a water purification plant."

The plans submitted by the petitioners provide for a pipe line from the present main belonging to the Eastmere Water Company and terminating near the Rutherford subway, easterly by the Philadelphia and Reading Railway Company's freight yards in a public road to Rutherford Heights village.

If this plan be approved, the source of supply will be that furnished by the Eastmere Water Company.

The petitioners verbally represent that the village of Rutherford Heights is very much in need of a supply of drinking water and that at least a year or more will be required in preparing plans and constructing pumping station, filter plants, reservoirs and pipe lines of the Rutherford Heights Water Supply Company and that meantime the citizens of Rutherford Heights village must be without the benefits of a system of water works unless the company be permitted to lay the proposed pipe line and temporarily take water from the Eastmere Water Company.

The Department is aware of the fact that the Eastmere Water Company was chartered in the year eighteen hundred and ninty-nine to supply water to the public in the village of Eastmere, Swatara township, and adjacent thereto, and a liberal interpretation of this charter right would be that the company could extend its mains beyond the confines of the village, and especially since the boundaries of the village were not specified in the charter. Such an extension has been made, however, during the current year without a written permit by the Commissioner of Health. Said company claims, however, that this extension was made in ignorance of the law and that no harm has been done anybody by said extension. The pipe from which the Rutherford Heights Water Supply Company purposes to get its proposed temporary supply is the one which has been extended without permission. The source is the Susquehanna River and the water is filtered by the city of Harrisburg and sold to the Eastmere Water Company. Thus the consumers of said company obtained a desirable public supply. The legal right of the city to so sell water has not been a subject for inquiry by the Department.

The Paxtang Consolidated Water Company, supplying Paxtang village in Swatara township, has already connected to the extended pipe of the Eastmere Water Company and is drawing, or has drawn, a portion of its supply from said Eastmere Water Company's new main, this having been done without a permit from the Commissioner of Health.

The Rutherford Heights Water Supply Company wishes to furnish a pure supply to Rutherford Heights at the earliest practicable moment and desires to do this under permission of the Commissioner of Health, but said Commissioner of Health is not empowered to grant a permit which will operate to extend the powers conferred by the charter of said water company. The Rutherford Heights Water Supply Company's charter provides that the company shall confine its source to the Swatara Creek at the place shown on the plan submitted by said company and on file in the office of the State Water Supply Commission, March thirteenth, one thousand nine hundred and seven. Therefore, unless the petitioners obtained a modification of the company's charter, the Commissioner of Health cannot approve of any source except the Swatara Creek. However, the Commissioner of Health could entertain a petition for an extension by the Eastmere Water Company of its pipe line to Rutherford Heights and this extension could be granted under the condition that it be within the charter rights of the Eastmere Water Company.

Therefore, approval of the plans of the Rutherford Heights Water Supply Company is hereby and herein declined for the obtaining of a source of supply from the Eastmere Water Company.

The petitioners have two courses open to accomplish the end desired: First, for the Rutherford Heights Water Supply Company to obtain a modified charter; second, for the Eastmere Water Company to apply for permission to extend its pipe lines to Rutherford Heights. Since the same financial interests dominate both companies, the consideration of the latter application would involve, principally, so far as the State Department of Health is concerned, matters relative to charter rights and technical questions relative to administration of State laws.

Harrisburg, Pa., August 16, 1907.

SOUTH RENOVO, CLINTON COUNTY.

This application was made by the borough of South Renova and is for permission to construct a system of water works for the supply of water to the public in said borough.

It appears that on November twenty-second, one thousand nine hundred and six, the Commissioner of Health, in response to the application of October sixth, one thousand nine hundred and six, sent the following communication to the borough officials:

"James P. Beckley, Chief Burgess,
and to the President and Members of Council,
Borough of South Renovo, Clinton Co., Pa.

"Gentlemen:

"I regret to learn of the inability of your Chief Burgess and the Council to attend the hearing office in Harrisburg, to-day, with respect to the application of your borough for approval of water works plans.

"It appears that the water works system is now owned and operated by the municipality. It comprises less than half a mile of street mains. A masonry reservoir on high ground at the foot of the mountain stores water from adjacent springs and is supplied to the borough by means of three inch pipes. Probably 750 people out of a possible population of 1,200 are supplied with public water during wet weather periods, and the remainder are dependent on four neighborhood wells and three copious springs on the mountainsides; but during the summer season the source of public supply become exhausted and the entire borough is compelled to have recourse to the springs on the mountainsides.

"The borough purposes to construct an entire new system of water works. Not any part of the existing plant is to be incorporated in the new system. The plans comprise a dam and intake reservoir on Hall Run west of South Renovo in Noyes township, three and, one-half miles of eight inch gravity supply main to the town, and 475 feet of eight inch, 5,250 feet of six inch and 1,000 feet of four inch distributing pipe in the streets of the borough, provided with suitable hydrants to furnish adequate fire protection.

"The said reservoir and about one mile of the supply main are to be constructed within the limits of the State Forestry Reservation for which permission has already been obtained.

"The dam is to be built of rubble masonry, and to be eighty feet long, seven feet high, two and one-half feet wide on top and four feet wide at the bottom and laid up from solid rock. It is to be provided with a spillway 50 feet in length in the center of the dam. The gate chamber is located at a point about twenty feet from the west bank and is provided with two screened inlets. The supply main ends in this chamber, is provided with a shut off valve and a protecting screen placed over the mouth of the pipe. It is ten inches in diameter. The elevation of the bottom of the supply main is 824, and the top of the dam 830, and the bottom of the inlets to the chamber are 3 feet below the top of the dam which is as low as water can be drawn off above the dam into the supply main. However, there is a 16 inch drain pipe outside of the gate house by means of which the entire reservoir may be drained, provided the flow should be less than the discharging capacity of the drain pipe.

"This structure will dam water back in the stream for a distance of four hundred feet storing up about 400,000 gallons of which only 200,000 gallons can be drawn out. It is proposed to thoroughly clean and grub the land to be covered with water. Analyses of water in streams about Renovo, having similar water sheds to Halls Run, indicate that the latter stream will furnish soft water.

"The area of the water shed above the proposed dam is approximately 10 square miles from information at hand in the Department, but the applicants state it to be 2 square miles only. This discrepancy has an important relation to conclusions as to the suitability of the proposed site for an intake dam.

"The borough expects the proposed water works to be capable of supplying a population of 5,000 people and a daily consumption of 670,000 gallons. When the proposed reservoir becomes inadequate a second reservoir shall be constructed at a point about one mile farther up stream where, by the erection of a thirty foot dam, a good sized storage reservoir can be obtained. Since plans of the water shed have not been submitted, it is not known whether facts justify these conclusions.

"The 8 inch supply main will be 17,360 feet in length, with a fall of 148 feet in this distance. A profile of the line has not been submitted. However, the plan shows blow-offs, one where the pipe line crosses Pete Run and the other where the line leaves Hall's Run Valley. Air valves are to be placed on the summit at stations 83 and 46. Blow-offs will also be located at low ends of the street mains, so that the entire system may be drained.

"Measurements of stream flows on the mountain sides in this locality indicate that Hall's Run will deliver a minimum flow of about 0.1 cubic feet per second per square mile, of 650,000 gallons daily at the proposed dam, provided the water shed is 10 square miles in area, but only one-fifth of this amount, if the water shed be only two square miles in extent, a quantity too small to warrant approval of a plan for an intake dam only.

"Since the borough is seeking a permanent supply in anticipation of a population of 5,000, the source should be capable of furnishing a daily supply of 500,000 gallons for ordinary purposes and an added amount for emergencies, such as conflagrations. For the present use, the domestic consumption is a negligible quantity, the controlling factor in the design being the water needed to afford fire protection.

"In a borough of dwellings only the supply of water should be sufficient to maintain a pressure of about fifty pounds at the hydrants when three fire streams of two hundred and fifty gallons per minute discharge were operating. This is equivalent to a rate of flow of one million gallons daily, which rate, through seventeen thousand feet of 8 inch pipe, could not be maintained under a head of 150 feet which is all there is available. A pipe 12 inches in diameter is necessary to supply this amount of water in South Renovo.

"The proposed 8 inch supply main would be capable of furnishing one fire stream only and maintain the pressure usually required by Fire Underwriter's Association. If possible, the 12 inch pipe should be put in. The borough authorities' attention should be called to the limited capacity of the proposed 8 inch main.

"Evidently the borough is desirous of installing the cheapest plant at this time. Undoubtedly the plans proposed would serve the purpose of affording a good drinking water, help boom the town and place the municipality in a position where it can, in the near future, assume the expense of improving and enlarging the water works system. The imposition of restrictions at this time

entailing large immediate expenditures might operate to postpone the construction of a public water works system and affiict a serious blow to the prosperity of the borough.

"Approval cannot be given to the dimensions of the in-take dam as shown on the plan submitted. On the basis that the water shed is ten miles in area, it would yield during intense downfall of rain, such as have been observed to occur in Pennsylvania, a volume of water which would submerge to a possible depth of six feet or over, not only the fifty foot spillway, but possibly the entire dam. In this event a failure of the structure now proposed would be inevitable. It should be redesigned as a spillway dam for its entire length of sufficient dimensions to maintain stability during periods of maximum freshet flow.

"The attention of the borough authorities is hereby called to the fact that a 4 inch street main is not capable of supporting more than one fire stream, and that 6 inch street mains are preferable to pipes 4 inches in diameter.

"In view of all the circumstances, I will approve the proposed water works, but not until plans of the proposed dam be changed to make the structure safe and to admit of warranting available a greater proportion of the water stored thereby. Farther, the borough should submit a plan of the water shed, so that we may determine definitely whether there is enough water in Hall's Run to meet the demands and that storage tide over dry weather and maintained the stored water in a satisfactory condition for drinking purposes, both now and for future use.

"I also suggest, furthermore, the desirability of the laying of the larger sized pipes at this time, if it is possible for you to make arrangements to do so, and I urge this on the score of economy and greater efficiency.

"Yours very truly,

"SAMUEL G. DIXON."

This communication was answered at length by the Burgess in a letter dated November twenty-seventh, one thousand nine hundred and six, in which, among other things, it was stated substantially that the water works system was not owned and operated by the municipality, but that the company believing that it would be to the mutual benefit of itself and the borough that some means be devised by which a good water supply could be obtained, offered to turn over to the borough the old plant, under certain conditions, and furnish the necessary funds to construct the proposed water works, provided the borough issue to the water company certificates of indebtedness secured solely and alone by the net income of the system, neither the works nor the borough being pledged beyond the income; therefore, the liability of the borough not being a debt in a constitutional sense. Recourse to this method, instead of that of the company's continuing to develop and operate the system was had because of the purpose of the State Forestry Commission to keep private corporations out of the reservation.

Later, the burgess further represented that it had been realized that larger mains were desirable, but that after going over every detail and taking up all sides of the question it became plainly evident that money could not be obtained for a larger main than eight inch, and that it was a case of this size or no water works. Furthermore, he represented that the necessities of the case demand that such a system be installed now as will answer present requirements. Financial ability to make alterations will come if the borough prospers.

In reference to the intake dam, it was represented that this structure is not to be located on the creek proper, but on a channel made by lumbermen years ago and used for driving logs. The original bed of the creek is sixty feet or more to the west of this channel and is separated from it by an island of gravel, or more properly a longitudinal ridge.

On December thirty-first, one thousand nine hundred and six, the borough submitted to the Department three plans, one showing the location of the original channel, the new bed and the proposed intake reservoir on Hall Run, another plan showing details of the intake dam as modified, and the third plan showing a profile of the pipe line from the intake dam to South Renovo.

It appears that South Renovo is located on the south bank of the Susquehanna River, opposite the borough of Renovo. Both places are in Clinton county. The latter municipality is hemmed in by a mountain and the river and its territory is thickly built up. South Renovo is located on a sloping plateau which is also bounded by precipitous mountains on the west and south, but the area possible of development for residences is quite extensive and here at present live not over twelve hundred people.

The repair shops of the Middle and Western Divisions of the Philadelphia and Erie Railroad are located in Renovo in which are employed from one thousand to fifteen hundred men.

Railroad business is the mainstay of the entire district. There is a demand for dwellings, more men will be given employment if accommodations are available, and activity in building operations is assured for the coming season.

South Renovo is favorably located, accessible, high, well drained on account of the surface slopes and also the geological structure which is largely gravel and sand. Broad streets and alleys have been laid out, and the borough lacks only an adequate public water supply and fire protective system to afford proper inducements to those seeking a place of residence.

In eighteen hundred and eighty-three, the South Renovo Real Estate Company laid out this residential suburb and the following year a few houses were built and occupied there. A slow but steady growth ensued and in eighteen hundred and eighty-three, when the settlement was incorporated into the borough of South Renovo, there were forty dwellings there. In eighteen hundred and ninety the population was two hundred and sixty. Ten years later it had increased to five hundred and during the last six years it has more than doubled. It is expected that the future growth will be accelerated provided water works and sewerage facilities are afforded because not a few of the residents of South Renovo will be likely to take advantage of the superior inducements. A population of thirty-five hundred people is anticipated for nineteen hundred and twenty and of five thousand for nineteen hundred and thirty.

The original promoters were on January thirtieth, eighteen hundred and eighty-nine incorporated under the name of the South Renovo Water Company for the purpose of supplying water to the public in South Renovo or in territory adjacent thereto. The existing water works plant was constructed as a beginning only. Halls Run was the logical and only source for a permanent gravity supply, but the population did not warrant the enterprise at that time. The pre-emption of the run by the State stopped the water company's project.

There are nine private sewers and one public sewer in the borough, all six inches in diameter and eight of which discharge into the river and two into Pete's Run, which is the westerly municipal boundary. They serve all told about two hundred and fifty people. There are said to be ten cesspools and one hundred and twenty-five earth privies, and where privies are used, slop water is thrown out onto the surface of the ground. Four private wells in the borough are considered suspicious as sources of drinking water, because they are shallow and in sand and gravel, and in the neighborhood of surface privies.

It appears that the assessed valuation of South Renovo is in the neighborhood of eighty-five thousand dollars and its bonded indebtedness thirty-one hundred dollars, so that the borrowing capacity of the municipality at present probably does not exceed three thousand dollars. In order to finance the municipal water works project, under legal advice, the borough officials have issued certificates of indebtedness to members of the South Renovo Water Company and others, in the sum of twenty-five thousand dollars. The principal and interest of which is secured and pledged solely and only on the net income to be derived from the proposed water works, said certificates being taken at par by the said members of the South Renovo Water Company and others. Thus neither the borough's assessed valuation nor its income by taxation has been pledged by securing this debt, which therefore it is claimed, does not come within the constitutional meaning of borough indebtedness.

Since the proposed reservoir and about one mile of the supply main are to be constructed within the limits of the State Forestry Reservation, and since the General Assembly of the Commonwealth of Pennsylvania, by an act thereof, duly approved by the Governor on the fourteenth day of April, nineteen hundred and five, conferred upon the Commissioner of Forestry the power and authority to give to the boroughs of Pennsylvania the privilege of impounding water upon forest reservations owned by the Commonwealth, and of constructing and maintaining lines of pipe upon and through the said reserves for the purpose of conveying water therefrom when it shall be to the public interest to do so, and the borough of South Renovo requested the privilege of impounding the head waters of Hall's Run on such Forestry Reservation in Noyes township, Clinton county, the Commissioner of Forestry on August twenty-eighth, nineteen hundred and six, granted unto the said borough of South Renovo the privilege of impounding and using said waters for a period of twenty-five years subject to certain terms, restrictions and conditions whereby the position of the intake dam and pipe line shall conform substantially to an attached plan, made a part of the permit, and whereby all construction work shall be done under the supervision of an officer to be appointed by the State Forestry Reservation Commission; public use of water in the borough to be subject, however, to the stipulation that the borough shall not charge in excess of twelve dollars per annum for unmeasured family or household use, and that those establishments using water in excess of the quantity ordinarily demanded for family use, shall purchase and install meters, the minimum matter charge to be five cents per thousand gallons, the borough of South Renovo to pay to the Commonwealth the sum of twenty-five cents annually for each dwelling house connected to the water system and for water purchased by meter rates, the sum of one cent for every thousand gallons used, the borough to have the use of water for fire purposes free of charge by the State, to have the privilege to furnish water service to the few dwellings which may be erected immediately continguous to the borough, because said territory,

during the continuance of this permit might be brought into the borough by an extension of the limits thereof; South Renovo to keep exclusive control over its water works system and not to lease, sell or attempt to sell, or sub-let any of the rights, or otherwise dispose of the privilege conferred by the Commonwealth under penalty of the permit becoming immediately null and void; and if at any time during the continuance of the permit, it shall become necessary to increase the size of the intake dam, or construct storage ponds or lay additional pipes, such privilege to be granted subject, however, during the course of construction, to supervision by Forestry Department.

The object sought in the restrictions in the permit of the Forestry Department is to protect the waters of Hall's Run from being monopolized by any private corporation.

It appears that Hall's Run lies wholly within the State Reservation above the point where it is proposed to divert the water to South Renovo. The point is about one and one-half miles south of the river. The Run rises in the mountains near the southern part of Noyes township, at an elevation of about eight hundred feet above the Susquehanna River and flows northerly a distance of six miles to said river, draining a wholly unpopulated precipitous area, covered with second growth jack pine, oak and chestnut trees. The geological structure of the water-shed is Pocono sandstone, in the stream bed and immediate vicinity, Mauch Chunk red shale and Pottsville conglomerate on the summits.

It has been ascertained that the area of the water-shed above the first dam is ten square miles, so that there is ample water area to supply the present and prospective needs of the town. The dimensions of the dam as now proposed differ from the former in that the dam is to be made five and five-tenths feet wide at the bottom, three and five-tenths feet at the top, the structure to be embedded in the rock and gravel formation three feet, and to show four feet above the bed of the stream. The storage capacity therefore will be less than formerly proposed. The screen inlet to the gate chamber is to be at the bottom. If occasion ever requires it, a second dam is to be erected about one mile farther up stream whose height will be thirty feet and storage capacity approximately one hundred million gallons. In no other respect does the new plan differ from the old plan of the dam, excepting that the original channel is to be cleaned out and brought into commission again, so that the freshest flows from the drainage area will largely pass down it.

In view of all the circumstances it has been determined that the proposed water works and source of supply will not be prejudicial to the interests of the public health and a permit is hereby and herein granted to the borough of South Renovo to construct said system on the following conditions and stipulations:

FIRST: Detail plans of the new water works shall be forthwith prepared and filed with the Department of Health on the completion of the system, or as much of it as is completed on or before January first, one thousand nine hundred and eight, and annually thereafter, plans of any additions or extensions to the system under the approval of the State Department of Health, shall be filed in the Department at the close of the season's work, together with any information in relation thereto which the Commissioner of Health may desire.

SECOND: If for any reason, at any time, in the opinion of the Commissioner of Health, the water supply has become dangerous, or prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health may advise, suggest or approve.

THIRD: Having in mind the possibility of the accidental pathogenic pollution of the source of supply whereby the public health would be endangered, the supply main and water pipe system shall be provided with adequate blow-offs and drainage facilities and values, so that any infection getting into the system can be immediately wasted.

FOURTH: This permit is granted under the further stipulation that the conditions of the permit granted by the State Forestry Commission shall be complied with.

Harrisburg, Pa., April 17th, 1907.

STEELTON, DAUPHIN COUNTY.

This application was made by the borough of Steelton and is for permission to increase its source of public water supply and to make extensions and improvements to its water system.

It appears that the borough of Steelton is an industrial community of about seventeen thousand inhabitants, located for about three and a half miles along the east bank of the Susquehanna River and bounded on the north by the City of Harrisburg (a narrow strip of Swatara Township intervening) and on the south by the borough of Highspire.

The incorporated territory comprises about one and seventy-five hundredths square miles, two thirds of it being on the flats and with, the exception of a portion in the northern part of the borough where there are public streets

and residences and the Pennsylvania passenger station, the flats are occupied by the works of the Pennsylvania Steel Company. This corporation affords employment to the several thousand citizens of the town and to others living in the suburbs and in Harrisburg.

The principal residence section is on the hillsides bordering the flats. These hills were the banks of the ancient river channel and on them will be the future real estate developments.

Along the foot of the hills extends the old Pennsylvania canal long since abandoned for navigation purposes, but now in use through Steelton by the Steel Company in connection with a supply of water for industrial purposes to the steel plant.

In eighteen hundred and ninety the population of Steelton was nine thousand two hundred and fifty and in nineteen hundred it was twelve thousand and eighty-six and now all indications point to a permanency of its present size and a normal future growth. Public improvements therefore, may be reasonably made in anticipation of such growth.

A system of sewers for sewage only was installed by the borough in eighteen hundred and ninety-nine and it now comprises about fifteen miles of pipes, the largest of which is twenty-four inches in diameter. There are several outlets all into the river at convenient points. Of twenty-eight hundred buildings in the town twenty-two hundred and fifty are on the line of the sewers, and all but one hundred and fifty of them are connected, so it is reported. Hence there are in the neighborhood of seven hundred dwellings from which sewage is deposited into receptacles and finally removed from the premises by other means than pipe conduits.

Few or no cess-pools are maintained, but privies abound off the line of sewers. Springs or shallow wells in the shale rock of the hills in proximity to earth privy vaults are liable to contamination and should be considered at least suspicious and should preferably be abandoned for a safe public supply if such be afforded. It is reported that about three thousand people rely on private wells and springs for drinking water.

The public water works system is owned by the borough. The plant was purchased in eighteen hundred and ninety-nine from the Steelton Home Water Company, since which time various improvements and extensions have been made to the system which now comprises an intake, pump well, duplicate pumping engines, a force main, storage reservoir, gravity supply main and distributing system in the town. Water is supplied to the borough of Steelton only.

Originally water was drawn from wells built on the shores of the island in the river opposite Steelton. The chief object of these wells was to intercept the silt carried by the stream and thus aid in maintaining a free pipe under the river to the pumping station, but the arrangement proved to be inadequate and was abandoned. Now the supply is taken from the river near the shore of said island and from a current of water often flowing from the west side of the river in a channel between this island and an island immediately north of it, which point is fourteen hundred and fifty feet from the pumping station.

The intake comprises a sheet iron funnel shaped cage resting on the river channel, its mouth being about six feet long by one foot high with vertical iron bars in it spaced two and a half inches on centres, connecting to a sixteen inch pipe extending easterly towards the town twelve hundred and fifty feet and connecting here with a more recently laid twenty-four inch pipe two hundred feet in length to the pump well. This twenty-four inch suction is laid deeper than the sixteen inch pipe, enters the pump well two and one-half feet from the bottom thereof and has an inclination upwards on a grade which when extended across the river will meet the present level of the intake funnel.

The pump well and twenty-four inch pipe were constructed since nineteen hundred to afford better facilities for handling the large quanities of silt and sediment carried by the river water. The pump well is fifteen feet in diameter, thirty-one feet deep and its bottom is about six feet below low river water. The sixteen inch intake owing to a rise in its line will not deliver water by gravity into the intake well in sufficient quanity to supply the pumps unless the river stage be about ten feet above the bottom of the pump well. So about one-half of the time during the year the intake pipe is connected directly to the pumps and the line operated as a suction main.

The water is raised from the intake well to the storage reservoir on the hill by two Deane compound condensing direct-acting outside-pack plunger pumps, each rated at one and five-tenths million gallons daily capacity, or directly into the street pipe system. The force main to the reservoir is twelve inches in diameter. The force main direct to the street system extends to Second Street only and is sixteen inches in diameter. It is cross connected to the twelve inch force main. The intention is to extend the sixteen inch main to the reservoir when funds are available.

At the present time, owing to the incapacity of the pumping engines to raise sufficient water into the reservoir to meet the demands of consumption when the river intake is used as a suction pipe, all of the flats in the northern

half of the town constitute a low service district which is supplied independently by the sixteen inch force main, throttled and under direct pressure from the pumps. The remaining portion of the borough is supplied by the twelve inch force main, surplus water only going to the reservior. To prevent excessive waste the water drawn from the twelve inch return pipe from the reservoir and supplied to the southern half of the borough is under less pressure because of the throttling of the pipe at Fifth Street and Swatara Street.

So it appears that practically all of the town is furnished with crude water without opportunity for storage and purification incident thereto. The consumption is about two million four hundred thousand gallons each twenty-four hours, ten per cent. being allowed for slippage. The pumps are operated continuously. According to reports the average consumption is one and seven-tenths million gallons daily and the total population supplied fourteen thousand two hundred. The local authorities report a total of thirteen miles of distributing mains.

When the river is high and carrying large quantities of sediment, the intake well is used as a sand pit, and the whole town is put on one service, all water being pumped to the hill reservoir where opportunities for sedimentation are provided. This structure when full holds about seven millions five hundred thousand gallons and its surface is reported to be two hundred and forty-nine feet above the door sill of the pump house on the river bank. The reservoir is located in Swatara Township immediately back from Steelton and distant from the pumping station by the line of the force main about seven thousand feet. It is an open earth embankment structure about one hundred and eighty-five feet square on the bottom with side slopes of two to one feet lined with brick and paved with sheet asphalt on the bottom and having a total depth to flow line of about twenty feet.

The main intercepting sewer of the city of Harrisburg empties into the river at a point two miles above Steelton's intake and it is known to be a fact that Harrisburg sewage may be carried by the current on a moderate stage of the river to the said intake. Ordinarily, however, most of this sewage passes along well to the east but over the intake pipe which lies exposed on the bottom of the river bed. It is also known that some of the joints of the pipe are not tight and there is constant danger of Steelton's supply being grossly polluted by Harrisburg's sewage. The typhoid fever rates in Steelton have been generally in excess of those for Harrisburg.

The records of the local Board of Health for the last ten years prior to one thousand nine hundred and six show that there have never been less than nineteen reported cases in a year and in one thousand nine hundred and two there were four hundred and four cases reported. For the year one thousand nine hundred and six the Local Registrar returned a record of sixty-three cases. For the first seven months of the current year, forty-one cases have been reported.

The intake being so near Harrisburg's sewers makes it a matter of wonder that the disease has not been more prevalent at Steelton. This is accounted for partly by the fact that various tests show that the water obtained at the intake, has for average conditions the characteristics of the river water of the west channel, which is the best the river affords. But none of it is free from suspicion, all of it is subject to more or less sewage pollution and its character is materially changed in moderate floods which may happen any month in the year. During higher stages there is no choice with respect to bacterial content of water as to the locations, but during the summer, the portion of the stream carrying the lowest number of bacteria is in the west part of of the east channel near the present intake. This portion moves well over towards the west side of the west channel when the fall rains swell the stream flow.

The epidemic of one thousand nine hundred and two was attributed to abnormal leaks in the suction pipe and the entrance of Harrisburg sewage into the Steelton system.

Eight-ninths of the entire Susquehanna River watershed, or twenty thousand and thirty square miles are above Steelton, comprising the three great divisions of the river system, namely, the Juniata River, area thirty-five hundred and thirty square miles, the West Branch, area seventy hundred and thirty square miles and the North Branch, area eleven thousand one hundred and forty square miles above Sunbury. The confluence of the last two branches is fifty-four miles above Steelton. The mouth of the Juniata is seventeen miles above Steelton.

Six thousand and eighty square miles of the basin are in New York State. Agriculture is the principal industry in a large part of the region. The waters are comparatively soft and except during extreme floods carry little suspended matter. From a bacteriological standpoint only occasionally do tests reveal organic matters poured into the stream from the cities on its banks.

Below in Pennsylvania in the anthracite coal fields the conditions are entirely changed. The Lackawanna River entering at Pittston is usually a black foul stream due to enormous amounts of culm, mine drainage and

municipal waste turned into it. The mine wastes have a coagulating and precipitating effect. The coal dust is heavy and readily settles in slow velocities, fills up depressions and is shifted about by the scouring force of storm flow. The Susquehanna above the Lackawanna River is a bright clear stream. Below on the eastern shore the inky waters may be seen for a long distance but finally it pervades the entire breadth of channel. There are numerous other smaller tributaries having the characteristics of the Lackawanna River. However, the various dams and pools in the stream act as settling basins and improve the appearance of the water. Freshets scour out the deposits and much of the coal is transported as far as Harrisburg and Steelton. The river coal dredging industry is pursued by a number of rivermen in these places.

The west branch drains a sparsely settled country. The character of the water along its lower stretch with respect to pollution is not different from that of the main stream in New York above Binghamton; but the water is not fit in its raw state for domestic supply.

The Juniata receives considerable sewage and manufacturing waste but little or no chemical evidence of it is ordinarily found near the mouth. This stream readily becomes turbid and the fine clays remain suspended for many days. They are susceptible to chemical treatment.

There is a total resident popluation of over two million people on the watershed above Steelton and the sewage of more than half this number may come down by Steelton in a day's time. This fact should take precedence of the fact that apparently during low stages of the river, the water is clear and as low in bacterial content as any large stream used as a source of public supply.

The river at Steelton is a suspicious source of drinking water. It contains at all times poison to a greater or less degree inimical to human life.

Owing to the markedly different geological formations of the river basin system the quality of the river water varies widely and often suddenly. The clays of the Juniata, the culm from the coal fields and the acid drainage, and the alkaline waters from the limestone areas all contribute to the peculiarity and the changes in the Susquehanna at Steelton both as to chemical ingredients and suspended matters. The mine drainage and the decomposition of iron in the coal wastes change some of the carbonates (alkalinity) into sulphates (incrustants) so that the permanent hardness is increased over that normally in the river. This effect has been observed to extend out from the east shore when the river is low, the sulphate being in excess in the east channel, and the carbonates in the west channel. The latter is especially due to the flows from the limestone valley of the Yellow Breeches, Condoguinet and the Juniata.

It is reported that the least average turbidity is found in that section of the river where the intake is now located. However, coal dredging in the vicinity modifies this condition for short periods. Tests have shown that while the coal dust readily settles out if permitted to remain in the water, it has the power to clog a filter quicker than any other substance in the Susquehanna River.

From all points of view it has been concluded that the general position of the present intake is best.

It is proposed to purify the water by slow sand filtration with preliminary treatment by roughing filters. There being no opportunity for securing adequate subsidence to properly prepare the water for slow filtration, except at a prohibitive cost, a primary filter will be built to be operated with a coagulent when the turbidity of the river water is over fifty parts per million, and without a coagulent when the turbidity is less than fifty parts per million, sufficient coagulent to be used to produce a primary filter effluent with a turbidity of not over twenty-five parts per million.

The existing intake and pump well and suction pipe are to be detached from the existing pumping machinery. They will be used hereafter only in connection with two new centrifugal pumps to be set up in the pump house and arranged to deliver raw water to the filter plant.

A return pipe will convey the filtered water to a new pump well to be built outside of the pump house and near the old well, whence the existing pumping machinery and a new three million gallon pumping engine now being erected, with a space left for a duplicate engine, will raise the filtered water to the open storage reservoir on the hill.

There is to be a connection between the raw river water raising main and the new filtered water pump well by means of which unpurified river water may be introduced directly into the storage reservoir or the distributing system of street mains in the town.

The type of filter proposed is adapted and designed to satisfactorily purify the river water without the permanent employment of a chemist and bacteriologist. Automatic arrangements are provided so that the plant will be safer in the hands of a superintendent of average ability than would a rapid filter plant.

The pumping station is located in the village on the flats at the railroad near the river bank at the foot of Conestoga Street. The proposed filter plant is to be located on the flats between the canal and the river at the corner of Franklin and Frederick Streets distance about sixteen hundred feet from the pump house. The elevations of the water in the intake chamber at the filter house is to be three hundred and twelve. The low water in the river is two hundred and eighty-four and twenty-three-hundredths or twenty-seven and seventy-seven-hundredths feet maximum vertical lift if the river water were to flow to the pump well by gravity, which it will not do until the twenty-four inch intake be extended as designed. The centrifugal pumps will force the water through a fourteen inch cast iron force main into a twenty-four inch wood stave pipe, the latter terminating in the raw water inlet chamber at the purification plant.

There are to be three roughing filters and three slow sand filters.

Each primary bed is to be twenty-nine and five-tenths feet long and twelve and sixteen-hundredths feet wide, so in all, there will be twenty-five-thousandths acres of primary filter surface. At the rated capacity of the plant when all three primary filter units are in commission, the rate of filtration will be one hundred and twenty million gallons per acre daily and when two filter units are in use the rate will be one hundred and eighty million gallons. For the present when the daily consumption should average about two million gallons per day, during the use of three filters, the rate will be eighty million gallons and when two filters are used one hundred and twenty million gallons. Such rates are comparable with good filter practice when operated with proper care.

Each sand filter is to be sixty-four and seventy-five-hundredths feet wide and ninety-nine feet long, so in all there will be forty-five-dundredths acres of slow sand filter surface. The primary treatment will permit of the operation of the sand filters at any rate desired up to ten million gallons per acre of filtered surface per day. At the rated capacity of the plant of three million gallons daily when three filter units are in use (all the beds will be continuously in service except when one or the other might need cleaning) the rate will be six and sixty-six-hundredths million gallons per acre daily and when two filter units are in use only, ten million gallons. Generally, therefore, each bed, when the entire plant is putting out two million gallons per day must yield six hundred and sixty-six thousand six hundred and sixty-six gallons corresponding to a rate of four and forty-four-hundredths million gallons per acre per day. These rates are well within the safe limit as predetermined by tests if the water be subject to proper preparatory treatment, so it is represented by the applicants.

The chemicals are to be introduced where the raw water enters the purification plant, whence the water will pass into the settling tank. This tank is to be forty-two feet long, ten feet wide and nine feet deep to the flow line, and its walls are to support apart of the superstructure in which the regulating apparatus, chemical tanks and machinery are to be housed.

Near the inlet end of the tank is to be a sand deposit chamber and an endless belt carrying bucket discs for conveyance of the sand to a hopper above drainage to the sewer. Concrete coagulant and limewater mixing tanks are to be built over the settling tank above the operating room floor. There are to be two tanks for the preparation of coagulant solutions and two tanks for the making of limewater. The former are to be provided with wooden racks, a spray pipe to distribute water over coagulant in the rack, perforated copper pipes in the bottom of each tank for agitating the solutions with compressed air, a steam connection for warming the solution and proper arrangements for the measurement and drawing off the solution in proper quantities. The two limewater making tanks are to be provided with a lime slacking box and an orifice box for measuring out water to be supplied to the limewater tank.

At the entrance chamber of the raw water a sampling device is to be installed to enable the attendant to ascertain the character of the river water, principally its alkalinity and turbidity, and to charge the water with a proper amount of chemical solution if any be needed.

The settling tank will have a capacity sufficient only to permit of about fifteen minutes retention when the plant is operated at its rated capacity. So only the heavier fiuculent matters will be precipitated there.

Across one end of the roughing filters, which are to be placed side by side, is to be an inlet chamber, overflow chamber and effluent chamber, one of each for each filter unit. The raw river water will enter the inlet chamber from the settling tank or main distributing channel and thence be distributed on the filter by a reinforced concrete distributing and wash water trough. Dirty water during washing will be delivered to the overflow chamber and thence to the sewer and wasted. The overflow will also afford a safety valve to prevent an excessive head on the filters.

The roughing filter material is to comprise a layer of screened river coal five feet in depth. The pieces are to be not more than one-sixth of an inch in diameter. This is to rest on three inches of fine gravel from one-quarter to one-twelfth of an inch in diameter, supported by a bottom layer four inches deep of gravel between one-fourth and three-fourth inches in diameter. In

the gravel underdrains the gridiron collecting system is to be placed, consisting of two inches perforated galvanized iron pipes, twelve feet long, parallel, six inches on centers with caps screwed on outer end and along the bottom of each pipe one-quarter inch holes spaced three inches on centers, all leading to a twelve inch flanged pipe set in the concrete division walls between the filters. The filtered water will thus be delivered to the effluent chamber of each unit.

The rate of filtration of each bed is to be gauged on bronzed weir plates near the top of each effluent chamber. In the effluent well are to be three lengths of spiral riveted pipe, open at the top and closed at the bottom. From one of these tubes a line of one-half inch brass pipe is to be connected with the twelve inch underdrain. From the second tube a similar line is to connect with the water on the filter above. The third tube will be bored with a one-half inch hole. Floats are to rest on the surface of the water in these tubes by means of which the loss of head and rate of filtration is to be indicated on gauge boards and indexes.

On the operating floor above the filters are to be the gates by means of which the filter rates may be manipulated and controlled. A filtered water channel extending across the ends of the filter units will collect the primary filter effluent from whence it is to be supplied to the slow sand filters through a sixteen inch wood stave pipe.

The three sand filters are to be built side by side. They are to be roofed over with concrete construction and covered with earth. At the side between the primary and sand filters are to be located the slow filter regulating chambers, apparatus and house. In this building and machinery will be installed for washing the dirty sand.

The water is to be delivered onto each filter unit over the walls of an inlet chamber, located in the south-west corner of each sand filter. An overflow pipe to the sewer is provided at this place. The water level is to be two and five-tenths feet above the sand surface. This level is three and five-tenths feet below the water level on the primary filters.

The sand is to be four feet deep, to comprise an effective size from twenty-nine hundredths to thirty-two hundredths milimeters with a uniformity coefficient between one and four-tenths to one and eight-tenths and is to rest on a three inch layer of broken stone whose diameters are to range from one-third to one-twelfth of an inch, supported by a nine inch layer of broken stone whose diameters are to range from one-half inch to three inches. In the gravel resting on the concrete bottom are to be nine parallel rows of ten inch half tile underdrains laid eleven feet apart and empting into the main underdrain formed in the concrete bottom and extending lengthwise across the filter. A twelve inch cast iron effluent pipe will lead from this main underdrain to the regulating chamber of each filter at the slow filter regulating house.

The rate of filtration of each slow filter is to be gauged by measuring the flow through a submerged orifice. This orifice is a brass plate twelve inches in diameter, adjusted to the end of a twelve inch spiral riveted pipe, carried by a float so that the orifice will remain always at the same depth below the surface of the water.

From the regulating well the water is to pass through the main filtered water distributing chamber from which it will leave the regulating house through a sixteen inch cast iron pipe connecting to a twenty-four inch wood stave pipe leading to the filtered water well at the pumping station.

The gauges, float tubes, etc., at the sand regulating house are to be arranged in substantial accordance with the regulating devices at the roughing filters.

In the second story of the sand filter regulating house is to be located a sand deposit box and the sand washers.

On the roofs of the sand filters are to be built the washed sand storage tanks. There is to be a set of pipes for the hydraulic transportation of dirty sand from the slow filters to the sand washers and another independent set for transporting the washed sand to the storage troughs on top of filters.

The water piping system at the plant is connected at three places with a twelve inch borough pressure main. One branch is eight inches in diameter and will feed the underdrainage of the roughing filters and also supply water to the power plant, toilet room, solution tanks and sand washer. The other three connections are six inches in diameter and will furnish water to four inch wrought iron pipes suspended underneath the roof of each sand filter on the centre line thereof, each pipe provided with two three inch fire hose valves, one thirty feet and the other seventy feet from the end of each filter, for the purpose of attachment to the portable sand ejector.

An eighteen inch sewer is to pass underneath the regulating wells of the roughing filters with fifteen inch openings into the bottom of each overflow or drainage sump of these three filters and thence northerly along the building covering the roughing filters and the sand filter regulating house and by the sand filters and down Franklin street to an existing thirty-six inch sewer under the Pennsylvania Railroad tracks to the river at the foot of said street. At the south-west corner of each slow filter the sewer is to have a connection with the filter overflow. The drainage of the regulating wells, toilets, waste water from sand washers, etc., is to be discharged into the sewer through a twelve inch connection to the slow filter regulating house.

The twenty-four inch filtered water return pipe is to terminate near the bottom of the new filtered water pump well at the pump house at elevation two hundred and ninety-five and fifty hundredths which is six inches higher than the bottom of the well. Into this well an eighteen inch suction pipe is to be placed, its mouth being eight inches above the bottom of the well. A fourteen inch branch from the river pumps will enter the chamber eight and one-half feet above the bottom. The well is fifteen feet in diameter and fourteen feet deep. When the water stands in it ten feet deep and the pumping engines are drawing water therefrom at the rate of three million gallons daily, in event of any accident preventing the filter plant from delivering water, there would be a margin of less than twenty minutes before the water in the well and supply pipe would be lowered sufficiently to require the shutting down of the pumping engines. This is a narrow margin. There is to be a sight gauge in the pump house connected with a float in the filtered pump well to indicate height of water in said well.

So it appears that the arrangements for the satisfactory purification of the peculiar waters of the Susquehanna at Steelton are comprehensive and exceptionally well designed. It is equally true that the design must be carefully executed under the responsible direction and supervision of an expert engineer skilled in this class of work, and that thereafter the plant must be operated under proper supervision or the processes will fail to accomplish the required efficiency. The rates of filtration proposed for the slow filters are high and obtainable only when the water receives proper preparatory treatment. Since it is the intention to run the plant continuously without technically trained attendants it would be prudent and is almost necessary that the operation should be placed under the control of the designer and builder for a period of at least twelve months in order that ample time be afforded the local authorities to become thoroughly conversant with the proper methods of operation.

The present difficulty of operating the intake pipe from the river as a suction main, and of keeping it open and sufficiently free from sediment and obstructions at certain other periods of the year, and the leaky joints admitting Harrisburg sewage diluted with river water into the main, render imperative in the interests of public health, efficiency and economy that the proposed extensions of the twenty-four inch intake pipe should be made without delay. Plans for this extension would be made in the near future and submitted to the State Department of Health for approval.

The per capita consumption in Steelton is abnormally high. Leaves, silt and sand in the water render the installation of meters at houses to prevent wasting water, an impracticable measure. After the filtered water is supplied to the system, it should be possible to reduce the total consumption by preventing waste. Much of the clogging material will reach the filter plant and be an annoyance there. As much of it as possible should be taken out at the intake well on the river bank.

There is no attempt in the design to provide for intermittent operation of the pumping engines and filters. If one is working the others must be. For all practicable purposes there is one apparatus only for the collection of the water from the source, purifying it and delivering it to the consumers. Whenever this apparatus is out of commission the people may have filtered water drawn from the storage reservoir on the hill. This holds from three days' to a week's supply. However, there is a by-pass which permits the cutting out of the filter plant altogether and the pumpage of raw river water into the reservoir or the street main system, as is done to-day. Typhoid fever in Steelton should drop down at once after filtered water is served to the consumers and all shallow wells and springs in the borough subject to contamination are discontinued. Undoubtedly the consumer takes precautions about drinking the river water, but these will be discarded when purified water may be drawn from the spigot or faucet. Therefore, should the raw river water charged with sewage be temporarily introduced into the water mains subsequent to the installation of the filter plant, the consumer might be caught unawares and an epidemic precipitated. The risk will be minimized by the construction of the new intake, but it will not be obviated by any means, and so the use of the by-pass should be restricted. The centrifugal pumps and the filter plant and the town supply engines are to be run continuously at uniform rates. All inequalities or fluctuations in the consumption and demands on the system are to be taken up in the storage reservoir. The least harm would probably occur if the raw river water were required to be pumped, when pumped at all, directly into the storage reservoir and never into the street system of pipes, or any part thereof. By so doing opportunities for sedimentation and natural purification may be availed of.

The use of the by-pass for raw river water should be prohibited, except in those specific instances where the Commissioner of Health may grant permission on request by the local authorities, on and after the date that the water purification plant be put permanently in commission.

Under the present arrangement of piping, in case of a leaky valve placed on the force main branch leading from the raw water main to the filtered water pump well, polluted river water might leak into the filtered water well and contaminate the ground supply, This possibility should be obviated by some

form of construction to be proposed by the applicants and when approved to be installed. Preferably an intermediate chamber should be provided in which all leakage would be collected.

It appears that to obviate the immediate expense of extending the sixteen inch force main to the storage reservoir, part of the filtered water may be delivered into the street mains and part may be pumped to the reservoir.

It would not be surprising if the long storage of filtered water in the reservoir should cause a marked deterioration in the quality of the water and if this should prove to be the case the remedy would be to cover over the reservoir or a part of it so as to exclude sunlight.

In view of the fact that the petitioners ask for permission to build a new sewer and to discharge the sewage there from into the Susquehanna River at a point a quarter of a mile above the present intake pipe, and in view of the fact that it would not be consistent for the State to compel the city of Harrisburg to prepare plans in contemplation of the ultimate discontinuance of the discharge of sewage into the river above Steelton's intake without requiring the borough of Steelton to do likewise, it has been determined that the interests of the public health require that a permit be granted and is hereby and herein granted for said sewer on the condition only that the permit to discharge sewage therefrom into the river shall be contingent on the ability of the borough authorities to show that it is not practicable at this time to divert said sewage into the river below the borough's intake pipe in accordance with a plan for the ultimate interception of all of the borough's sewage. If the said authorities can show reasons satisfactory to the State Department of Health why said sewage should be temporarily permitted to go into the river above said intake, then such a permit shall be granted which in no event shall be for a longer period than the date to be fixed by the Governor, Attorney General and Commissioner of Health relative to Harrisburg's sewage outlet and for the preparation of plans for the interception thereof. At such date, or before it, the borough of Steelton shall prepare plans for the interception of the flow from its sewer outlets and submit the same to the State Department of Health for approval.

It has been determined that the said improvements to the water-works system hereinbefore fully described will not be prejudicial to the public health, and a permit is hereby and herein issued therefor under the following conditions and stipulations:

FIRST: If practicable the borough shall during the present low stage of the river forthwith proceed to caulk and render tight all points on the existing intake pipe and plans for a complete intake well and pipe shall be made and submitted to the Commissioner of Health for approval during the current year.

SECOND: No raw river water on and after the date when the proposed water purification plant shall be put permanently in commission, shall be introduced into the filtered water well or into the distributing system, except in those specific instances where the Commissioner of Health may grant permission on request by the local authorities. When so introduced, the raw river water shall be pumped directly into the storage reservoir and into the reservoir only. Before constructing the by-pass between the raw water main and the filtered water pump well, the borough shall adopt some form of construction to prevent possible leakage from said raw water main into said pump well and submit the plans thereof for approval, and when approved the arrangement shall be installed.

THIRD: The proposed improvements shall be executed under the responsible direction and supervision of the consulting engineer who designed them, or by some one skilled in such matters, and on completion of the work the borough shall select the men who are to attend to the operation of the plant and said attendants shall be placed under the direction and control of said engineer or expert for a period of not less than ten weeks and preferably twelve months on and after the date when the purification plant is put into practical commission for the purpose of securing the greatest efficiency in filter operation in the interets of the public health.

FOURTH: Weekly reports of the operation of the plant shall be kept on blank forms satisfactory to the State Department of Health and copies thereof shall be filed with said Department. If at any time, in the opinion of the Commissioner of Health, the water works system, or any part thereof, or the water furnished thereby, has become defective or insufficient or prejudicial to the public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may advise or approve.

FIFTH: The extension of lateral street mains may be made on condition that at the close of each season's work plans of work during the season, together with any other information which may be required in connection therewith, shall be filed in the office of the State Department of Health.

SIXTH: A complete report of the test of the filter plant before it is finally put in commission by the borough shall be submitted to the Commissioner of Health. From time to time the State Department of Health will make tests of the water and the borough shall assist. If found desirable or necessary, the Commissioner of Health may prescribe standards of efficiency and make regulations for the operation and maintenance of the plant.

The maximum rates of filtration proposed are high and experience may prove that the filtering surface must be enlarged. This enlargement presumably has been contemplated. If not, it should be.

Harrisburg, Pa., September 11th, 1907.

TARENTUM, ALLEGHENY COUNTY.

Tarentum Water Company.

This application was made by the Tarentum Water Company of Tarentum, Allegheny county, and is for permission to extend and improve its water works system for the supply of water to the public in Harrison and East Deer townships and in the boroughs of Brackenridge and Tarentum.

It appears that the Tarentum Water Company was first incorporated in June, eighteen hundred and eighty-five, for the purpose of supplying water to the public in the borough of Tarentum. The Harrison Township Water Company, located at Natrona, was incorporated in September, eighteen hundred and eighty-seven. The East Deer Township Water Company of Tarentum was incorporated in September, eighteen hundred and ninety-seven. The merger of these companies, under the name of Tarentum Water Company, was approved May, nineteen hundred and six, so that the territory covered by the consolidation is confined to Tarentum borough and Harrison and East Deer townships.

The Allegheny Valley Water Company was duly chartered in April, nineteen hundred and six, for the purpose of supplying water to the borough of Cheswick, Allegheny county. At the same time the Springdale Township Water Company and the Harmer Township Water Company were incorporated and authorized to supply water in their respective townships. These two companies have been purchased and are now controlled, so it is reported, by the Allegheny Valley Water Company. It does not appear that a merger or legal consolidation of these various companies under approval of the State has been effected. It is evident, therefore, that the extension of the Tarentum Water Company's main into Springdale and Harmer townships and to the borough of Cheswick for the supply of water to the public therein, is beyond the power of the State Health Commissioner to grant. Such permission should be subsequent to territorial rights duly granted by the Department of State and approved by the Governor.

The borough of Tarentum is located on the west bank of the Allegheny River in the north-eastern part of Allegheny county about twenty-one miles above Allegheny City, and on the West Penn Division of the Pennsylvania Railroad system. It is bounded on the north by Harrison township and the borough of Brackenridge, recently incorporated out of said township, and on the west and south by East Deer township, said townships extending along the river for two miles below Tarentum, the villages of Creighton, Hites and Glassmere being located on the railroad on the banks of the river in this township. Above Brackenridge, in Harrison township, is the large village of Natrona. These places are all supplied by the Tarentum Water Company.

At Tarentum the river valley is narrow and the slopes rather precipitous, so that a large portion of the town is located on the higher ground leading up to the steep slopes. Some of the buildngs are on the summit of the hills whose elevations are about two hundred and fifty feet above the river.

Bull Creek flows down from the north, penetrating the ridge paralleling the river and enters the Allegheny River about midway of the borough, dividing the municipal territory into a north and south district. There are numerous springs outcropping on the slopes to the creek and the river which have in times past furnished drinking water to the citizens. Individual wells in the borough are not uncommon. It is reported that there are over two hundred and fifty now in use.

The manufactories which are the principal support of the community are located in the valley between the railroad and the river. The Pittsburg Plate Glass Company, employing over five hundred hands, occupies land along the river south of Bull Run and the Tarentum Paper Mills, employing one hundred and fifty hands, has a plant here also. On the bank of the river, near the Brackenridge line, are the works of the Flaccus Glass Company. In the neighborhood of five hundred people are employed here. Outside of the borough in the townships below and above and along the river, there are extensive industrial plants for the manufacture of steel, glassware, chemicals, etc. Owing to the rough topography of the land back from the river and also owing to means of transportation, the citizens of the district have found it convenient to erect or occupy dwellings on the slopes contiguous or adjacent to the railroads and the river, and probably these facts are indicative of the limitation of future developments in the district. Many of the employees reside in Tarentum who are engaged during the day in shops in the townships. The population of the borough is estimated to be seven thousand; in nineteen hundred it was five thousand, four hundred and seventy-two and in eighteen hundred and ninety it was four thousand, six hundred and twenty-seven.

There are no physical lines dividing Tarentum from Brackenridge. The latter borough is said to have a population of about two thousand, and it is rapidly growing. There are two important glass works there employing about five hundred and fifty hands, supplied with spring water for drinking purposes and connected with the public sewerage system.

The village of Natrona has a population of about forty-five hundred. That part of the village south of Pond street is served by the Tarentum Water Company; the northern part is furnished with water by the Pennsylvania Salt Manufacturing Company.

Tarentum has a municipal sewerage system whose facilities are very generally availed of. Quite a number of the dwellings, however, discharge kitchen waste on to the ground or into street gutters.

The public sewer outlets are into the river. There are four of them in the north district and two of them in the south district.

The Tarentum Water Works system comprises a filtering crib in the river, intake wall, pumping plant, force main, subsidence storage basin, gravity supply main and distributing pipes.

The intake, pumping station and reservoir are located in the borough of Brackenridge.

The crib is a frame structure about one hundred and forty-five feet long and sixteen feet wide in plan, sunk in the porous channel of the river and covered with stone,, gravel and coarse sand through which the river water percolates and is clarified and from whence it is conveyed by gravity to a pipe about forty feet long to an intake well made of brick eighteen feet in diameter and located on the bank of the river. Into this well the pump suction is inserted. There is a direct connection between the well and the river whereby river water may be admitted to the well without having to pass through the filter.

There are two steam pumping engines, one three million gallons capacity and the other two million per twenty-four hours. Both pumps may draw water either from the well, the filter or through a twelve inch intake pipe seven hundred feet out into the river.

So far as the Department is informed, the smaller pump can deliver water only into a twelve inch risng main, four thousand feet in length, to the storage on the hill; but the larger pump may deliver water either into the reservoir or directly into the distributing system in the town, through an eight inch force main. Therefore, whatever safeguard may be afforded by the filter crib and subsidence basin may be dispensed with at will and raw river water be introduced into the home of the water consumers without any change whatsoever in its quality.

The reservoir is a concrete structure, open on top about one hundred and twenty-eight feet square and twelve and one-half feet deep to the flow line which is elevated two hundred and twenty-five feet above the pumping station. Detail plans have not been submitted, but the capacity is reported to be one and one-half million gallons. This structure is located on the summit of the high ridge back from the river in Brackenridge.

Formerly when the works were first built in eighteen hundred and eighty-six, springs on the western slope of this hill were piped to a reservoir and pumping station located on Little Bull Creek and the water raised thereby into a tank on the hill. This system was long since abandoned and the entire supply is now obtained from the Allegheny River.

The basin is provided with a cleanout. The accumulations of river silt and sediment in the basin, which accumulations required frequent removal, are drawn off through a cleanout pipe into an adjacent ravine draining to the river.

The distribution of the water from this reservoir is all on one service. There are twenty and five-tenths miles of street mains of which seven miles are four inches in diameter, five miles eight inches, three miles six inches, two and three-tenths miles two inches and about one and five-tenths miles of pipe ten to twelve inches in diameter. There is also some three inch pipe and one inch pipe. In the water district there is a total population of twelve thousand and eighty—the actual consumers numbering ten thousand six hundred and fifty-five. The population using the public supply in Harrison township, including Brackenridge borough is two thousand three hundred and eighty five. In Tarentum borough seven thousand four hundred and ninety and in East Deer township seven hundred and eighty. It is estimated that the consumption averages two million one hundred and twenty-five thousand gallons daily of which two million are used for domestic purposes. This large per capita rate is attributable to waste on account of the poor quality of the water; many of the householders keeping the faucets open and water running continuously. The water is often muddy and always polluted by sewage. The sewers of Natrona village discharge into the river at a point a little over a mile above the filter crib and intake well. The sewage from industrial plants and from a large population is also discharged into the river above the Tarentum intake at many places. Physicians and health officers have urged the borough consumers to use filtered and boiled water. Notwithstanding this advice which is carried out to some extent, typhoid fever is prevalent as would be expected under the circumstances.

The Department has had a canvass made of the district, physicians' records have been examined and it appears that up to August first, of the current year, beginning January first, nineteen hundred and five, that there has been a total of five hundred and seventy-eight cases and thirty-one deaths.

These figures are largely in excess of the cases reported by the local physicians and returned to the Department by the local registrar. The distribution of the cases among the water consumers total thirty-four for East Deer township, two hundred and ninety for Tarentum, one hundred and fifty-seven for Brackenridge and ninety-seven for Harrison township. It appears for nineteen hundred and five, that there were one hundred and two cases in all, and for nineteen hundred and six, two hundred and ninety-two cases and for nineteen hundred and seven, one hundred and eighty-four cases in the district. During nineteen hundred and five, in Natrona, out of thirty cases attended by one physician, twenty-six were on the Tarentum supply, and the same physician attended ten cases in nineteen hundred and six in the same village on the same supply. It is reported that the portion of Natrona supplied by the Salt Manufacturing Company's system of water works has been free from the disease in those families supplied exclusively by this water, which supply is obtained from springs located on the hillsides and protected from pollution.

On July twenty-fourth, nineteen hundred and seven, the Commissioner of Health notified the Tarentum Water Company that its source of supply is prejudicial to public health and requested said company to submit a plan for the filtration of the water to the State Department of Health at as early a date as possible.

An agreement has been made between the Roberts Manufacturing Company of Philadelphia and the Allegheny Valley Water Company operating the Tarentum Water Company's works, whereby the said manufacturing company is to erect within a building and upon foundations to be furnished by the purchaser, a gravity filtration plant to be located on the hill continguous to the Tarentum Water Company's reservoir, and to consist of three coagulating or subsidence tanks and six mechanical filter units with all necessary appliances and appurtenances and guarantees that the filtered water shall be bright and clear and practically free from suspended matters, turbidity and discoloration, and that the filtration plant shall be capable of delivering three million gallons of water each twenty-four hours and that when the number of bacteria in the raw water is three thousand or more per cubic centimeter, there shall be a bacterial reduction in the filtered water averaging not less than ninety-eight per cent. as determined by an examination of not less than thirty samples collected from the filtered water collecting flume in a period of not less than fifteen days; and that when the number of bacteria in the raw water is less than three thousand per cubic centimeter, the filtered water shall show an average of not more than one hundred per cubic centimeter as determined by similar examinations, which guarantees are made subject to the condition that the purchaser will operate the plant properly and according to instructions, that a suitable quantity of coagulant shall be used, that the guaranteed capacity of the plant shall not be exceeded and that the filters and coagulating tanks shall be cleaned as frequently as the condition of the raw or applied water may necessitate.

The water is to be drawn from the Allegheny River through the existing apparatus and to be delivered into the proposed coagulating tanks at the reservoir by the existing pumping engines and force mains.

The raw or applied water is to be coagulated with sulphate alumina prior to or simultaneously with its delivery into the subsidence tank. The three tanks will provide two hours' subsidence when the tank is operated at the rate of three million gallons per day of twenty-four hours. Each tank is to be thirty-one feet in diameter by fifteen and thirty-three hundredths feet inside depth and each is to have a twelve inch inlet from the force main terminating in a stilling chamber extending to the top with horizontal openings to admit the water to the tank as quietly as possible. Each tank is also provided with a skimming weir box fitted with a twelve inch discharge connected to the sixteen inch main leading to the filters. Each tank is also provided with a blow-off eight inches in diameter leading to the twelve inch drain which discharges into the ravine leading to the river below the intake.

The coagulant is to be applied to the water by an automatic apparatus consisting of a propeller wheel placed in the force main near the tanks which will actuate a variable stroke feed pump designed to take the coagulant solution from the solution tanks and deliver it into the force main leading to the three subsidence tanks. It is intended to use a coagulant solution of uniform density, the volume to be applied to the raw water, varying with the stroke of the feed pump. Thus the speed of the pump and the amount of solution will vary with the velocity of water and hence quantity of raw river water supplied to the plant. The contractors will establish the displace of the supply pump for a given turbidity of water, so that the attendant by observing the varying turbidities may adjust the displacement accordingly and secure the admittance of a proper amount of solution for any particular turbidity. There are to be two coagulant solution tanks, each six feet in diameter by five feet high, properly housed, together with said coagulant feed pump. The settling tanks

are to be set outdoors, each to have a conical cover. They are to be vertically baffled and the settled water will flow from them through the sixteen inch supply main to six wooden filters, each fifteen feet inside diameter, six and five-tenths feet high inside containing about two and five-tenths feet of sand resting on eight inches of gravel, the filtering area of each being one hundred and seventy-six square feet and the capacity of each unit being five hundred thousand gallons daily which is equivalent to a rate of filtration of one hundred and twenty-five million gallons per acre each twenty-four hours. The filter units are to be placed in a row in a building about twenty-five feet wide by one hundred and twenty-feet long.

The manifold system for the collection of the filtered water and for washing the filters is of the customary form of construction in filters of this type. The central cast-iron manifold is to have connections on either side of extra heavy wrought iron pipe one and twenty-five hundredths inches diameter, placed in parallel rows six inches on centres, extending to the inner side of the filter and cut in various lengths to fit the circle. On to these branches are to be screwed in all seven hundred and ten strainers made of brass and spaced six inches apart. The manifold system is to be imbedded in concrete brought up flush to the bottom of the strainer upon which the eight inches of gravel rests. The filtered water is to be delivered through this collecting system of each unit into the filtered water collecting flume in front of the row of filters below them and extending the whole length of the building. This flume is built of concrete seven and five-tenths wide and about five feet deep and slightly sloping from the ends of the building towards the middle where there is a sump for the suction of the centrifugal pump to be installed for the purpose of furnishing water for washing of the filters. Near this point also is the delivery main twenty inches in diameter connecting the flume with the present storage reservoir. This pipe is to be put at an elevation to insure a depth of water in the flume sufficient to always seal the effluent pipe from each filter.

The influent pipes and the effluent pipes and also the piping system from the centrifugal pump for supplying filtered water to wash each filter are all suspended in front of the filters over the filtered water flume, and most of the valves in connection therewith have their stems extended to the standards on the operating floor above which is also over said filtered water flume.

The dirty wash water is to be discharged into a concrete waste flume paralleling the filtered water flume and extending lengthwise across the filter house directly under the filters. This conduit has connection with the main drain of the plant leading to the ravine.

Each filter unit is to be equipped with an improved surface washing, reversible power agitator, of the rake type, the high water line will be controlled by butterfly valves and floats and each unit is to be equipped with an effluent rate controller or regulator.

The facilities for washing seem to be ample. Power is to be furnished by a twenty-five horse power gas engine, and the centrifugal pump is to have a capacity of thirteen hundred and fifty gallons per minute, which will supply water at the rate of seven and one-half gallons per minute per vertical foot when washing. The drainage from the plant should be conducted to the public sewerage system as soon as the State requires the town to build and operate disposal works for the purification of the sewage.

If carefully and intelligently operated, the plant should give a fairly good effluent especially under ordinary conditions of river water. But the operation must be carefully attended to. Best design would require that from six to eight hours be provided for sedimentation. Probably more subsidence than now proposed will be proven desirable by experience, and additions may have to be made in the near future. More especially since the settling tanks have two hours capacity only at the nominal rate of the plant, should a different method of coagulant feed be installed than now proposed. Preferably the chemical should be introduced at the pumping plant to effect a more thorough mixing and preparation for subsidence. And all of the water should be pumped to and pass through the filter plant to the storage reservoir before being supplied to the consumers. The changes in the quality of the Allegheny River are sudden at times and the amount of chemical solution should be correspondingly changed. If the apparatus were at the pumping station, it might not be necessary except during prolonged periods of high turbidities when the worst water was being delivered raw to the filtration plant, that an attendant would be required at the purification plant in the night time. Otherwise, such attendance might be necessary.

The general layout is an attempt to secure an efficient plant at a minimum cost for installation. It will be expensive to operate and maintain. The petitioners have a project for the construction of a new subsidence basin or reservoir on a hill further back from the river to be used for primary sedimentation, so it is reported. Such subsidence cannot be afforded at this time for lack of money to meet the expense, so it appears. Therefore, the operating costs of the proposed filter plant will be relatively high until facilities for more thorough primary treatment of the raw water is afforded.

The present arrangement of the piping system leading from the pumps whereby raw river water may be delivered to the street main, is objectionable and must not be continued. All water should pass from the pumps directly to

and through the filter plant into the filtered water storage basin. All intermediate connections should be severed and it be impossible for water to be delivered to the consumers except from the filtered water reservoir.

The intention of the Allegheny Water Company to furnish all of the communities along the west bank of the Allegheny River from Natrona to Harmerville with filtered water from the Tarentum purification plant, if ultimately carried out, will call for very material increase in the size of the plant. If rights to do this are legally acquired, extensions to the filter plant would probably be demanded immediately on the execution of the project. It is the purpose of the State Department of Health to protect the public health and at the same time the security of the investments in public water works by maintaining an active supervision of the operation of such works after they come under the jurisdiction of said Department. A filter affords a sense of security to the water consumers, but the real security it affords depends upon efficient operation under conditions which the filter was designed to meet.

It has been determined that the proposed water works extension and improvements, so far and only so far as they relate to the charter rights of the Tarentum Water Company and the Harrison and East Deer Township Water Companies now merged with it, will not be prejudicial to public health, and a permit is hereby and herein granted therefor under the following conditions and stipulations:

FIRST: On completion of the proposed purification plant, which shall not be later than the end of the current year, the water company shall file with the State Department of Health complete and full detail plans of said plant as built of the filtered water reservoir, force mains and all valves, pipes and appurtenances, together with any other information in connection therewith required by the Commissioner of Health.

SECOND: On or before January first, nineteen hundred and eight, the water company shall file a plan of the proposed extensions to its street main systems for approval. After approval at the close of each season's work, the company shall file a plan of the pipes laid during the year, in the office of the State Department of Health, together with such other information in connection therewith as may be required by said Commissioner.

THIRD: The proposed filter plant shall be operated under the responsible direction of the experts who erect and guarantee the plant for a period of twelve months in order that the water companies' attendants may be afforded a reasonable time in which to become thoroughly schooled in the responsible duties of efficiently operating the water purification plant. A full report of the initial test of the plant shall be submitted to the Commissioner of Health and thereafter the water company shall assist the State Department of Health in making such tests of the plant from time to time as may be found desirable. If necessary, the Commissioner of Health may prescribe standards of efficiency and make regulations for the operation and maintenance of the plant and the entire water works system.

FOURTH: Weekly reports of the operation of the water works shall be kept on blank forms satisfactory to the State Department of Health and copies thereof shall be filed with said Department. If at any time, in the opinion of the Commissioner of Health, the water works system, or any part thereof, or the water furnished thereby, has become defective, or insufficient, or prejudicial to the public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may advise or approve.

FIFTH: The introduction of raw river water into the street main system or anywhere except into the filter plant, is absolutely prohibited. There being duplicate pumps and force mains and facilities for storing one and a half million gallons of filtered water, necessity does not exist for an emergency connection between the pumps and the street mains. To the contrary, the interests of the public health demand that all connections with the force mains between the pumps and the filter plant, shall be absolutely cut off and plugged up permanently, so this is made a special stipulation.

SIXTH: The coagulant solution shall be introduced at the main pumping station where it can be under the constant supervision of an attendant, since the pumping machinery is operated continuously throughout the twenty-four hours of each day. There shall be an attendant at the filter plant in daytime and at night also, if night supervision be found necessary in order to secure the highest efficiency obtainable by the plant.

SEVENTH: The drainage from the filter plant shall, when required by the Commissioner of Health, be conveyed by a suitable pipe to and connected with the public sewerage system.

EIGHTH: The filtered water flume shall be covered by a water tight concrete floor to obviate any possible contamination of the filtered water. And the filtered water reservoir shall be enclosed in a fence to protect the water thus stored from accidental or malicious pollution. Possibly this structure may require to be covered in the future.

Harrisburg, Pa., September 6th, 1907.

WARREN, WARREN COUNTY.

Warren Water Company.

This application was made by the Warren Water Company and is for permission to extend and improve its system of water works in said borough and to obtain an increased source of ground water supply.

It appears that Warren is a borough of about ten thousand population, located in the central part of Warren county on the Allegheny river and Conewango Creek. The latter stream comes down from the north and divides the borough into East and West Warren. The Allegheny River comes from the East and divides the town into a third part which is south of the river and known as South Warren. The old portion of Warren is in the western district.

A general system of sewage has been constructed at public expense and is maintained by the municipality. The outlets are into the Conewango and the Allegheny at various points.

These facilities have been generally availed of and so have those afforded by the public water works system. It is estimated that the population now using the public supply is eight thousand, the remainder obtained drinking water from dug and driven wells scattered in the outskirts generally. Most of the wells are shallow and in gravel. Their number in the borough approximates three hundred and fifty.

The Warren Water Company was chartered September twenty-eight, one thousand eight hundred and eighty-one, and the works were built and completed in the following year. The system is now operated by the American Water Works and Guarantee Company which owns the majority of the stock and guarantees the full value of the bonds.

The plant comprises a surface supply, a ground water supply, pumping station, distributing reservoir and high and low service water district.

The surface water is obtained from Morrison Run which is a small tributary of the Allegheny River. A small reservoir has been erected on this system. It impounds one million five hundred thousand gallons, covers an area of about three-fourths of an acre and has an average depth, when full, of about six feet. The area tributary to this reservoir comprises about twelve square miles of precipitous, wooded and uninhabited land, excepting five dwellings, three of which are in the lower part of the water shed. These dwellings are occupied by farmers who have under cultivation, all told, approximately three hundred and fifty acres. The elevation of the reservoir is about two hundred feet above the business part of Warren. A ten inch supply main furnishes East Warren with this water by gravity. All of the borough might be supplied if the quantity of water available were sufficient. During the summer months Morrison Run is not able to furnish any water and at such times the entire municipal supply is obtained from the ground.

The average daily consumption for all town purposes is one million four hundred thousand gallons. During periods of extreme cold weather the draft is considerably in excess of the average consumption.

The ground supply is from drilled wells located on an island at the junction of the Allegheny River and Conewango Creek. This island contains nine acres. It is long and narrow and extends up into the Conewango Creek. The lower half of it is occupied by dwellings and manufacturies and there is a public highway there. Near the central part thereof, between the highway and the river, the water company owns a lot containing about half an acre upon which is located the pumping station and the driven wells. Formerly the water supplied to the borough was taken from the centre of the Allegheny River, but about one thousand eight hundred and ninety, owing principally to the pollution of the river, it was abandoned and the ground supply substituted.

There are five wells drilled about sixty-five feet terminating in gravel. Each well is cased with eight inch pipe extending down through hardpan to a depth of about thirty-five feet. Inside of this eight inch casing a six inch suction pipe is inserted to the bottom. The space between the pipes at the top is packed with oakum. These suctions are connected up to the fourteen inch main suction to the pumping engines of which there are four, one having a capacity of two million five hundred thousand gallons and the other three having a capacity of about one million gallons each. It is estimated that the available ground water at the area now owned by the water company, when five wells are used, is not in excess of three million gallons daily.

A ten inch force main extends from the pumping station to a brick lined distributing reservoir on the hill distant four thousand feet. The storage capacity is one million gallons. The reservoir is kept full and held in reserve for fire protection. Ordinarily, the pumps deliver the water directly into the pipe system in the town, but during a conflagration the reservoir water is turned on, which increases the head to about one hundred pounds. With the reservoir shut off the normal pressure in the centre of the town is about fifty pounds.

There is an emergency connection between the river and the pumping station which was sealed on November twenty-ninth, one thousand nine hundred and five, by order of the Commissioner of Health. At this time it was also cemented so that it would be impossible to open the valve on the connection without first taking away all the cement.

The agreement made between the borough and the Warren Water Company, under which it is operating its system, among other things, provided that the water company shall furnish a sufficient quantity of pure water for domestic uses and to this end, the said water company has on several occasions requested the advice and co-operation of the State Health Department.

For three days, beginning April fourteenth, one thousand nine hundred and six, there was an epidemic of bowel trouble numbering all told about four hundred cases most of which were not of violent enough character to require medical attendance, although severe enough to make the presence of the epidemic manfest in the community. The outbreak was attributed to impure water especially since the disease made its appearance coincident with black color and heavy sediment contained in the public water supply. Evidently these foreign ingredients could not come from the ground. They may have come from Morrison Run reservoir, or the distributing reservoir, or from deposits in the water pipe system. On April fourteenth, there was a freshet and also a heavier one four days previous. On the water-shed of Morrison Run there are about forty oil wells of which thirty are being worked. If at the time of these freshets any of these wells have been shot, the waste material of considerable amount deposited on the surface of the ground round about would have been washed into the stream and could have discolored the water and made it black in those parts of the borough where Morrison Run water ordinarily flows. The elevation of the reservoir on the run is about two hundred feet above the town equivalent to eighty-seven pounds static pressure. The districts which are normally supplied by pump water are those reached under the pressure of fifty pounds which is that usually maintained at the pumps. When the pressure is increased to a total of about one hundred pounds no water would enter the system from Morrison Run, but to the contrary the pumps would force water out into Morrison Run reservoir. The line in the water pipe system where the gravity supply and the pumping supply meet is a constantly varying one. Ordinarily, the gravity supply includes the east and south districts. Therefore, the pollution of Morrison Run water as aforesaid, would be likely to manifest itself in these two districts and quite possibly also in the main portion of the town. Roily water is fed from Morrison Run occasionally into the centre of West Warren.

Investigations do not show that there was an accumulation in the distributing reservoir of any amount of sediment or black coloring matter, therefore, the discoloration of the water on or about April fourteenth, must have come from Morrison Run or the stirring up of deposits in the water pipe system. It is not probable that the latter sediment could have caused the epidemic.

Providing the disease was water borne the only other portal of admittance to the system than Morrison Run or the distributing reservoir was the suction pipes to the pumps. At this time the river was higher than the top of the drilled wells and the main suction pipe.

Tests of the water collected during April, did not show the presence of bacteria of the Colon group.

Upon recommendations to the borough council, said recommendations being made by the Warren Board of Health, the water company was requested to build a ten foot tight board fence around the distributing reservoir, and to provide for the admission of the water to the reservoir at the end farthest from the outlet, to remove sediment from Morrison Run reservoir and to construct a dyke there to prevent stagnant water from adjacent swales from entering the public supply. These requests were promptly complied with by the water company, who notified the State Department of its willingness to comply with any requirements which the Commissioner of Health might make.

On November eighth, one thousand nine hundred and six, a special committee of the borough council (appointed to investigate the subject of certain charges relative to the quality of the water supply made by Dr. Ball, the president of the local board of health) made a formal request to the Health Commissioner in conjunction with the manager of the water company, that an inspection of the sources of supply be made by the State. This inspection was delayed until December eleventh. On Friday, December seventh, an epidemic of gastro-enterits began and continued with severity until Wednesday, December twelfth, although a few cases were noted for over three wells thereafter.

During the day of December seventh, one thousand nine hundred and six, several doctors were called in to the homes where there had suddenly occured several cases of gastro-enteritis, most of them resembling a mild ptomaine poisoning or arsenical poisoning. During Friday night and Saturday there were probably six hundred people in the borough of Warren taken down with this trouble, nearly all of whom employed doctors. On Sunday there were about four hundred new cases who had medical attention. A few more came down with the same symptoms on Monday and perhaps a dozen more afflicted on Tuesday and Wednesday. Altogether the doctors in the boroughs looked after more than a thousand cases of severe gastro-enteritis between Friday noon and Tuesday noon, and there were probably at least five hundred or six hundred other cases among the poorer people who did not consult doctors. Practically all of these eighteen hundred people has similar attacks and in the greater part of the cases the attacks were severe.

The prevailing symptoms were sudden severe cramps in the stomach, followed by vomiting, diarrhea and great weakness. A few cases only had high fever followed by syncope. The excreta were watery and brownish in color. The greater part of the patients felt badly for about three to six hours and then recovered. However, quite a number were seriously ill. In most cases the recovery was reasonably rapid, and the greater part of the number afflicted almost completely recovered within thirty-six hours.

The disease was not prevalent in other places within a radius of sixty miles.

A review of the evidence has made prominent three facts: First, the cases occurred in families where public water was used exclusively, or among those living in the outskirts who drank public water when in town. Second, that of the one thousand individuals receiving medical attention, about nine hundred had not boiled the water, and among those where the water was boiled, raw water was still used for brushing the teeth. Third, the cases were principally located in the old part of the town which is supplied by ground water. However, prior to, during, and after the epidemic, the pumps were shut down night times, so the ground supply was thus cut off and Morrison Run water furnished to the entire borough. These shut downs were between midnight and six o'clock in the morning.

Suspicion is directed therefore, to either the ground supply or that from Morrison Run (the distributing reservoir not having been used) unless the medium of transmission was by means of food, milk or the ice supply.

Upon investigations of the milk, ice and food supply, these were found to be above suspicion, and it was concluded in view of the general distribution, suddenness of attack and virulence of the disease, that the public water supply was probably the medium of transmission.

Immediately upon the outbreak of the epidemic, the local authorities, water company and the State Department of Health, began special investigations to determine and remedy the case of the infection. Those made by the company prior to the epidemic had shown the water supply to be satisfactory.

All tests showed the distributing reservoir water to be good. Also relative to the private wells about the town, that of fifteen different wells tested, the water proved to be superior, with one exception only, namely, the Wales well in South Warren. Colon were present at intervals in the water drawn from the wells at the pump house and in Morrison Run water; they were always present in the river and mill race water.

An examination of the records shows with respect to the Morrison Run tests, that colon, were present on December eighteenth, the twenty-second and on January nineteenth, after which the water analyzed was apparently pure. On November twelfth, the run was low in bacterial contents. November twenty-fifth, the reservoir was drained, cleaned and washed out. On the night of the twenty-sixth, the run water was turned on to the town for the first time in six months. Sewage pollution of this reservoir on account of its small capacity, would pass away quickly during freshet flows. On December sixth, the day before the epidemic, there was a rainfall of one and three-tenths inches. The ground was frozen and the run off was, therefore, effectual as a scour. Sewage pollution anywhere on the water-shed would have been washed away and passed through the reservoir, so that while tests prior and subsequent to the epidemic did not show sewage contamination, it might have been present. There was heavy rain on December thirteenth of sixty-four-hundredths inches and one again on the thirty-first of nine-tenths inches, between these dates Colon were found in the water indicating an existence on the water shed of some source of pollution. Besides the sixteen persons permanently residing there, there are kept approximately fifteen sheep, six horses and fifty head of cattle. Again in January nineteenth, Colon were found following a rain of three-tenths inches of the day previous. After that the precipitations were principally snow-fall. The privies at the dwellings are in reasonably good condition. The principal danger of pathogenic pollution is apprehended from the custom of the attendants at the oil wells. No sickness was found on the water-shed.

If the pollution came from the surface supply, in this connection, it should be noted that while Morrison Run water had been supplied to the town from November twenty-sixth on, probably thirty per cent. of the inhabitants being furnished with this water, that on December sixth, when the heavy rain occurred, and for several days prior to this time, the pumps were shut down between midnight and six A. M. during which time all of the people were furnished with Morrison Run water, so that if the infection came from this source, it could have reached all parts of the town. Corroborating this view is the fact that muddy water was drawn from the mains in east, south and central part of Warren, beginning the day before the epidemic and continuing for more than twenty-four hours.

This is also coincident with the observed facts relative to sediment during the April epidemic.

An examination of the records shows, with respect to the tests of the water drawn from the wells at the pump house, that colon were present in water collected December eighth, and ninth. In the next sample collected on December sixteenth, there were none found, but in the next sample collected on

December twenty-second, the colon were again present. Subsequently water was collected daily and anaylzed, beginning December twenty-ninth, and in every sample Colon were found, excepting on January seventh and eleventh, up to the twelfth, which was the last day when any evidence of sewage pollution was discovered, although the tests were continued through January and February.

The possible sources of pollution of the well water were, first, the river and mill-race; second, several sewers, and third, privies.

All of the dwellings on the Island are within a radius of five hundred feet of the pump house wells. There are fifteen such dwellings at each of which there is a privy over a dry earth vault dug in the ground. The soil is porous. The nearest privy is fifty feet distant and five others are so located as to possibly pollute the ground from which the water is drawn, but eight of the fifteen privies are located on the bank of the mill-race. There are also six other privies in connection with the shops and manufacturies on the Island, one of which is within two hundred feet of the wells, but all of them are near the bank of the river or mill-race.

The Island is separated from the mainland by the mill-race. Near the lower end of it a dam was erected years ago for power purposes. The water is diverted into the mill-race by means of a dam across Conewango Creek near the upper end of the Island. The relative elevation of the water in the race and the river at low stage is about nine feet. During ordinary freshets the race water is about three feet higher than the river. The highest water ever recorded flooded the Island three feet deep. Inundations have occurred three times in fifteen years. The ground is four feet higher than the dam at the race and thirteen feet higher than mean low water in the river. The five driven wells have their casings capped ten feet below the ground, so the caps are three feet above mean low water in the river and six feet below the constant level in the race. About each well a wooden box about six feet square was constructed to serve the purpose of a man-hole and admit of ready inspection of the caps and packing. These man-holes extended to the surface and are covered over by a wooden trap door. The Island here is four hundred feet wide. The wells are located mid-way between the race and the river. Ordinarily the bottoms of these man-holes are dry, but they are entirely covered with water when the river rises to an elevation of a foot or so above the caps, showing a very direct or speedy means of communication between the river and the man-holes, and also showing lack of communication between them and the race whose water is constantly six feet or more above the caps.

The mill-race has operated as a sedimentation basin for years. The water therein is stagnant for months at a time. Possibly the sediment may be the effective barrier preventing percolation through the ground to the river.

As has been observed to be the case elsewhere, the rise and fall of the water in the wells at the pump house follows closely the rise and fall of the water in the river. The normal pressure of the ground water when the river is low is reported to be equivalent to a head of several feet above the river and probably tweny feet above the hard pan stratum which makes this pressure possible. This underground roof which confines the water to the lower strata is thirty feet below the surface of the ground. It is known to extend up to the river eight miles and up the creek four miles and down the river about three miles. At the Island its thickness is four and one-half feet. Below this is the water bearing stratum of gravel which feeds the pump house wells. Because of the upward pressure, surface pollution could not contaminate this deep water except at the caps, the packing, or through some imperfection in the piping. However, should the pressure fall below the roof, then surface water and pollution might follow down the casings through perforations, which might exist where such casings punctured the hard-pan and poison the well supply. There is no evidence showing that the pressure is thus ever relieved. What might happen were more wells sunk here and larger quantities of water drawn from the ground, is problematical.

There are two public sewers crossing the Island and discharging into the river. The Liberty Street sewer, fifteen inches in diameter and serving about one thousand people, is five hundred feet down stream from the wells. It is a terra cotta pipe with cement joints and is laid about twelve feet deep. The other public sewer is in the extension of East Street. It is eighteen inches in diameter, serves about two thousand people and enters the creek nine hundred feet above the wells. It is a tile sewer, cemented joints, about six to eight feet deep and built eighteen years ago.

Another sewer extended from the Engineer's residence and pump house to the river, passing by the edge of two man-holes at the walls nearest the pumping station and about level with the bottom thereof. The sewer was supposed to be cast iron pipe but events subsequent to the epidemic have proven it to have been a six inch tile, poorly laid with partially uncemented joints out of which sewage seeped into the surrounding ground, rendering the ground filthy in places. This pollution was accelerated every time the

river rose sufficiently to backflood the sewer and fill the lower part of the man-holes. The water company began on December first, the work of laying a new sixteen inch suction main from the old suction main to a new pumping engine being installed in the station. It was necessary to cut a piece of pipe out of the old main and insert a new piece therein with a branch and valve on it. The excavations and other preparations were completed and on the morning of December sixth, between midnight and six A. M. when the pumping station had to be shut down, the old main was cut and the new insertion made. This work was done within eight feet radius of three of the wells, so that the force of the blows necessary to cut the pipe could have been transmitted these short distances sufficiently to have loosened pipe joints and the packing in the casings about the walls. This packing comprised oakum and tar. It had been in place possibly seventeen years.

When the insertion was made the bottom of the man-holes was comparatively dry, that is, no backflooding from the river occurred but by the morning of the next day, December seventh, in the afternoon of which the epidemic began, the river had risen sufficiently to backflood the man-holes to three and one-half feet deep above the well tops. The river did not subside enough to uncover said tops until December twenty-first. A heavy rain the last of December flooded the wells again from January first to the sixteenth inclusive.

The laying of the sixteen inch suction pipe from the insertion to the pumps was completed about January first, the line crossing the sewer at about intersecting grades, hence the integrity of the sewer was endangered and the fact that it was a tile pipe and in bad condition was then discovered, so the superintendent reports. If it were discovered when the insertions were made, the workmen did not inform the superintendent. Thereupon, the dwelling and pump house were disconnected, the dwelling vacated (about the twenty-fifth of December) and was not again occupied until about the middle of February when a new four inch cast iron sewer from the house to the river was completed. A six inch iron sewer from the pump house to the river was laid in the latter part of February.

Between January sixteenth and the twentieth, during which the river was down below the bottom of the man-holes, the water company embedded each well top in a concrete pillar about three feet in diameter and about three feet deep, the top of the concrete extending about twelve inches above the cap on the well, and the bottom of the concrete extending below all joints and packings. After this the tests of the water drawn from the well showed a remarkably low bacterial content, comparable with analyses made of the well water immediately prior to the epidemic and at intervals during several past years.

At a special meeting of the town council held on the evening of December twenty-seventh one thousand nine hundred and six, a resolution was adopted, requesting the water company to immediately drill more wells on the Island. Thereupon, a test well was put down about the first of February and another one the following week. Both were eight inches in diameter.

The first well was sunk to a depth of one hundred and thirty-two feet, the last fifty feet of which was in hard rock. Above it was six feet of clay and soft shale rock, and above that eight feet of quicksand and then thirty-three feet of water bearing gravel covered by a hardpan four and one-half feet in thickness. This hardpan is thirty-one feet below the surface of the Island. Above it and resting thereon are nineteen feet of porous gravel. The top cover to the surface is twelve feet in thickness and consists of loam and alluvial deposit. Experienced oil drillers in this region express the unanimous opinion that had the well been carried to below the hard rock, salt water would have been encountered and possibly some oil. At any rate the test showed conclusively that the source of ground water available for a town supply is to be found only in the gravel below the hardpan.

Tests of this water showed the presence of Colon in the surface ground water but none in water taken from the stratum below the hardpan.

The second well was drilled into the gravel below the hardpan, a total depth of about sixty feet from the surface. Tests of this water from February fourteenth to March fourth, inclusive, show a superior water free from pollution with a maximum of water bacteria of six only.

The company proposes to utilize these two wells and to sink five other new wells on its property on the Island, and to connect them to the pumping machinery whereupon the old wells will be filled up and abandoned. This conclusion has been reached because of the results of the Company's examinations showed that the deterioration in the old well water was probably due to some leaky threads or in the packing around the top connections of the wells permitting flood water to seep into the wells during high stages of the river. While a sealing of all tops of old well connections seems to have effectually stopped the pollution, yet as a postive insurance, and to protect the ground supply from future surface contamination, the Company purpose to

abandon the old connections, fill up the old wells with concrete and protect the top connections of all the new wells by water tight concrete boxes or man-holes extending above the river high water mark.

Reviewing the terms of agreement between the Borough and the Company of February ninth, one thousand nine hundred and three, the stipulation that Morrison Run dam shall be maintained at its present site or a new dam built higher up on the stream of sufficient storage capacity to supply the entire Borough as far as practicable from this source, need not be given lengthy consideration as a solution for a permanent source of supply. While the water shed is ample in area and a reservoir of sufficient capacity could be erected there, the pressure would not be satisfactory for fire purposes, and ultimately filtration might be required to render the water safe and as satisfactory as a good ground supply. The total expense involved would be greater than the municipality could assume were the authorities contemplating municipal ownership. The fact should not be overlooked that the revenue from the sale of water in a town of Warren's size places a limit on what it is practicable to do so long as the works are owned and operated as an investment. A municipality may run a plant at a loss, but a Water Company cannot do this for any great length of time.

Because of the oil wells and the population on Morrison Run water shed and the difficulty of enforcing sanitary rules and regulations there, considered in connection with the limited amount of water which the Run as at present developed can furnish the town, this source of supply should from the standpoint of the public health, be entirely abandoned by the Water Company, unless the water be first adequately filtered. Filtration of this water would not be economical, therefore, the Morrison Run supply should be abandoned.

Sustaining this conclusion are the facts observed during the April epidemic. Probably this source was the vehicle of transmission of that infection, coming from the spring scour of the water shed. However, the disease was less acute than that of the December epidemic, showing that the latter must have been a more concentrated and virulent poison.

The opinion is well founded from the evidence before the Department of Health, that the deep ground water at the Island will furnish a sufficient quantity of pure water for domestic uses. The poisoning of the ground water supply that caused the December epidemic came from the surface from a leaky sewer located in close proximity to the wells on the Water Company's property, which wells suddenly developed leaks caused by repairs and alterations made a few hours before the epidemic immediately prior to the rising of the river which flooded the wells, forcing escaping sewage into them in sufficient quantities to thoroughly impregnate the supply with virulent infection.

It has been determined that the proposed extension of the ground water supply of the Warren Water Company will not be prejudicial to the public heath, provided the menaces on the Island, which are the present methods of the disposal of sewage, and the possible deterioration of old piping in the ground due to corrosion, the menaces in the borough above the Island along the streams due to the pollution of the streams and mill race by sewage from public and private sewers, and the menace at the State Hospital for the Insane, due to the discharge of sewage therefrom into Conewango Creek, all be abated.

Action has already been taken by the Department of Health towards providing for the proper disposal of the sewage of the State Hospital, the Borough authorities will be requested to remove the sources of pollution above the Island within the corporate limits and a permit is hereby and herein granted to the Warren Water Company to increase its source of ground water supply at the Island as proposed, under the following conditions and stipulations:

FIRST: The Morrison Run supply shall be either filtered or abandoned; but it may be kept as an emergency source and be used without filtration only in extreme cases. At such time, the local and State Department of Health shall be notified. Sanitary inspections of the water shed shall be made monthly by the company who shall file reports thereof with the State Department of Health and take such precautionary measures as may be necessary to safeguard public health.

SECOND: Because, in case of a great conflagration, it might be necessary to have recourse to the Allegheny River water, the company may maintain an intake thereto, subject to conditions to be agreed upon by the borough council and the Water Company subject to approval of the Commissioner of Health. Detail plans of this intake and its connections shall be filed with the State Department.

THIRD: As soon as the proposed new wells and their connections have been completed, the old wells and their connection shall be abandoned and the wells filled up with concrete cement and made water tight.

FOURTH: No new wells shall be located within less than ten feet of an old well. The casing pipe shall be eight inches interior diameter, length to be

securely screwed together in a sleeve and where the casing passes through the hardpan cover of the water bearing gravel stratum, precautions shall be taken to fill up the space between the outside of the casings and the circumference of the hole, so that no water can pass up outside of the casings through said hardpan. This precaution is specially necessary in case a sleeve were to be driven through the hardpan.

FIFTH: The concrete man-hole boxes to be erected at the top of each well shall be made water tight and carried up five feet above the surface of the Island. They shall be at least five feet square, interior dimensions. The special pipe fittings at each well at the top thereof shall be at least twelve inches in the clear above the bottom of the inside of the man-hole and lugs or a flange collar on the casing shall be imbedded in the concrete bottom of each man-hole and securely tied in by re-inforced concrete iron bars spaced eight inches apart. The walls of each man-hole shall be re-inforced by some approved method of construction. Where the horizontal suction pipe passes through the walls of the man-hole, the joints shall be made tight by the use of a flange collar imbedded in concrete.

SIXTH: The water in the distributing reservoir shall be renewed weekly, and the pipes so arranged there that the water will enter at the opposite end from the outlet thereof. Plans for an efficient means of readily draining the reservoir shall be prepared and submitted to the Department of Health for approval.

SEVENTH: After the borough shall have provided a public sewer on the Island, upon request by said borough's council, the Water Company shall discontinue the discharge of any sewage from its property into the river and shall connect said property with said sewer. The old tile sewer shall be abandoned and either dug up for its entire length or be filled with cement grout after first being thoroughly disinfected, preferably by live steam.

EIGHTH: Plans of the pumping station, all piping, wells etc., shall on completion of the proposed improvements be prepared and filed with the Department of Health.

NINTH: If at any time, in the opinion of the Commissioner of Health, the water supplied by the Warren Water Company to the borough is not suitable for drinking and culinary purposes, then such remedial measures shall be adopted as the Commissioner of Health may advise or suggest or approve, and weekly analyses of the water shall be made by said company and reports thereof filed with the Department of Health, together with such other information relative to the operation of the plant as the State Department of Health may require.

Harrisburg, Pa., March 15th, 1907.

WASHINGTON TOWNSHIP, FRANKLIN COUNTY.

Blue Ridge Water Supply Company.

This application was made by the Blue Ridge Water Supply Company of the village of Blue Ridge Summit, Washington Township, Franklin County, Pennsylvania, and is for permission to install a system of water works for the supply of water to the public in said township.

It appears that the Blue Ridge Water Supply Company was duly incorporated under the laws of the State on August first, One thousand nine hundred and six, for the purpose of supplying water to the public in Washington Township, Franklin County, Pennsylvania.

Several years since the Blue Ridge Water Company of Washington County, Maryland, was incorporated and erected works for the supplying of water to certain summer cottages in the mountains in the neighborhood of the settlement on the main line of the Western Maryland Railroad known as Blue Ridge Summit at or near the Maryland State line. The word "Summit" is given to the locality because it is the highest elevation on the railroad between Baltimore, Maryland and Hagerstown, Maryland. Here people of resources have built cottages for summer occupancy and originally these houses were all supplied by well water and the sewage disposed of in cesspools. After the neighborhood was visited by a small typhoid fever epidemic, there was a demand for a deep well water supply which culminated in the formation of the said Maryland corporation and the erection of water works system. About one-half mile south of the Pennsylvania State line on land of Joseph Roach at the summit of the divide, two wells were drilled about three hundred and twenty-five feet deep. Over each was erected a small frame pump house in which was installed a gasoline engine and pump. These pumps are now in operation and discharge through three inch galvanized iron pipes, into an underground, concrete covered reservoir, having a capacity of about twenty thousand gallons. From this reservior a four inch cast iron pipe extends to and along the county road in Maryland (which road parallels the ridge some distance below and north of it) to the railroad passenger station at or near the State line.

The wells are sunk for almost their entire depth through solid rock, and the water therefrom appears of excellent and satisfactory character. It is reported that the discharge from the two wells is approximately seventy thousand gallons per twenty-four hours, but at the present rate of consumption, it is not necessary to operate more than one pump at a time and that not continuously.

There are twenty cottages in the village in Maryland and about that number in that part of the village which has been developed within the State of Pennsylvania. The present supply of water at the houses on the Pennsylvania side is from wells. The petitioners request approval of plans for the laying of two thousand and three hundred feet of three inch, eighteen hundred of two inch and seven hundred and sixty feet of one and one-half inch pipe, all within Pennsylvania. In the future, extensions of the pipe system are to be made from time to time to meet demands. It is expected that the houses and stores along the projected lines will be connected to the system and that the maximum consumption by these consumers will be about nine thousand gallons per day.

It has been determined that the proposed source of supply and the water works system will not be prejudicial to public health and a permit is hereby and herein granted therefor under the following conditions and stipulations:

FIRST: That all laws applicable thereto regulating the business in which the Blue Ridge Water Supply Company purposes to engage shall have been complied with.

SECOND: That detail plans of the layout, of the wells and pumping station and the reservoir shall be prepared and filed by said company in the office of the State Department of Health.

THIRD: Permission to extend the water works system in the streets is given under the express stipulation that at the close of each season's work a plan of the extensions laid during the year shall be prepared and filed with the Commissioner of Health, together with any other information in connection therewith that may be required.

FOURTH: If at any time, in the opinion of the Commissioner of Health, the said source of supply or the water works or any part thereof shall become prejudicial to the public health, then such remedial measures shall be adopted as the Commissioner may advise or approve.

Harrisburg, Pa., November 23rd, 1907.

SEWERAGE.

Sewerage and Sewage Disposal Permits and Decrees issued by the COMMISSIONER OF HEALTH Up to January 1, 1907.

This work has also been done under Act 182 of 1905. This law is a distinct departure in Pennsylvania State Medicine, in that it provides for State prevention of water borne diseases. Formerly the powers committed by statute to the State Board of Health relative to regulations tending to limit the spread of infection by water carriage were advisory only. It was within the Board's sphere and duty at all times to recommend to local authorities having the usual powers in matters relating to the preservation of public health, the adoption of effective sanitary and preventive regulations and measures in anticipation of future or possible epidemics.

The policy of limiting the State Department to powers of an advisory character only, until the actual presence of an epidemic threatens everybody in the community, so vividly shown to be suicidal in the extreme at Butler, in the memorable epidemic of 1903-04, ceased with the enactment of the law of 1905. Therefore, in the prosecution of the work thereunder, precedents have had to be established. It has been pioneer effort.

Sewage in the Act is defined as "any substance that contains any of the waste products or excrementitious or other discharge from the bodies of human beings or animals." Slops, sink and wash water come within the meaning of the term. The prevailing idea that laundry water and drainage from bath tubs is not sewage is gradually being dispelled; but not without some educational effort in making clear that such wastes very frequently contain pathogenic poison, and that they are often discharged onto the surface of the ground near the springs and wells, or into street gutters, and thence to streams used below as sources of public water supply. Also that some manufacturing wastes are not sewage as above defined, but if a menace to public health, they are subject to regulation at the discretion of the Commissioner of Health.

The law stipulates that no person, corporation or municipality shall place or permit to be placed, or discharge or permit to flow into any of the waters of the State any sewage except as specially provided; but the Act does not apply to waters pumped or flowing from coal mines or tanneries. Neither does it prevent the discharge

of sewage from any public sewer system owned and maintained by a municipality, provided such sewer system was in operation and was discharging sewage into any State waters at the time of the passage of the Act. A copy of the law has been sent to every municipality.

The exception noted, however, does not permit the discharge of sewage from a sewer system which shall be extended subsequent to the passage of the Act. Therefore, it is understood that so long as a municipal sewer system in use before April 22nd, 1905, be not extended, the law is not applicable and the sewage therefrom may continue to defile the public water supply. What constitutes an extension has been the subject of considerable contention by local officials. A sewer system must, in the course of events, be extended. Department officers and agents have been instructed that evidently the intent of the law is to bring, as soon as possible, all municipal sewer systems under State regulation and control, to the end that the purity of the waters of the State for the protection of the public shall be accomplished.

Unapproved sewer extensions to an existing sewer outlet whereby the volume of filth discharged into a stream was quadrupled would defeat the object of the law and be contrary to the letter thereof. It is understood that the State officials have determined that it is the principle involved which shall control and not the length of the sewer extension.

The law further provides that upon application duly made to the Commissioner of Health by public authorities having by law charge of a sewer system of any municipality, the Governor, Attorney General and the Commissioner of Health shall consider the case and whenever it is their unanimous opinion that the general interests of the public health would be subserved thereby, the Commissioner of Health may issue a permit for the discharge of sewage from such public sewer system into any of the waters of the State and may stipulate in the permit the conditions on which such discharge may be permitted. The permit before being operative must be recorded in the office of the Recorder of Deeds for the county wherein the outlet for the sewer system is located.

As understood, the policy inaugurated is to bring about the abandonment of streams as carriers of sewage. All sewage must finally cease to be discharged, untreated, into any waters used subsequently for drinking purposes.

In a municipality whose borrowing capacity has been about reached, the erection of sewage purification works for the present is thus prevented. However, it is the policy of the State, set forth in the permit, to require this municipality or any other, in extending its sewers, to make such extension in compliance with plans contemplating treatment works in the future.

It also appears by what follows that a town should obviate the making of a petition every time a petty sewer extension is contemplated, by the submission in the first instance of a general application for sewer extension, involving the question once for all of State policy for that particular municipality. State approval under these circumstances implies careful consideration of the problems involved. The principal one relates to the disposition of sewage.

The student of the permits may note that one feature is based on the proposition that it is not practicable to treat large volumes of mingled sewage and storm water, owing to the prohibitive cost. Usually it is cheaper and better to build separate sewers for sanitary household drainage and to provide other channels for the removal of rain water.

Also that another feature is based on the proposition that efficiency and economy in preserving the purity of streams for the public protection dictate that sewers shall be built to conform to a comprehensive plan. Municipalities are learning that patch work methods are bound to cause trouble, expensive alterations and repairs, and that those towns which have employed competent consulting engineers to lay out comprehensive systems and have thereafter conformed to the plan in construction, have usually found such a course to be profitable.

Temporary permission to discharge sewage, untreated, into a stream has been granted in 34 instances. Seventeen formal rejections of sewer plans have been issued and one rejection relative to sewage disposal. Nine municipalities and two State Institutions have been required to prepare sewage disposal plans at once. Six municipalities have been required to submit plans for sewage disposal works when called for by the Commissioner of Health. Fifteen sewage treatment works have been designed and the plans thereof approved by the Department and in eleven cases immediate construction was ordered, construction in two years was ordered in one instance and construction in three years was ordered in three instances.

A supplementary permit was issued to Carlisle and an extension of time was granted to New Castle.

Of the 34 permits to temporarily discharge sewage into the waters of the State, 7 stipulated the preparation of plans for sewage disposal works within six months, namely, Johnsonburg, Oakmont, Verona, Cresson, Kane (White Rock Land Company), Coraopolis and Kane borough (Second application); eight of the said 34 permits expire in one year, namely, Titusville, Ford City, Scalp Level, East McKeesport, Wall, Pitcairn, Jeannette and Bedford, the last five municipalities being required to submit plans for sewage disposal works on or before the expiration of the year; four of said permits cease at the expiration of two years, namely, relative to Warren, Blairsville, Ford City (second application) and Saltsburg; seven of the said permits cease at the expiration of three years and they obtain with Yorkville, Williamsport, Williamsport (second application), Taylor, Lancaster (third application), Baden and Chartiers township, the last two places being required to plan for sewage disposal works when called for by the Commissioner of Health; the remaining eight permits refer to Philadelphia, where five years has been stipulated in which to prepare plans to abate existing nuisances caused by sewage pollution of State waters.

The rejected sewer plans were for the following places:

Wyoming, Columbia, Johnsonburg, Edgeworth, Edinboro, Cambridge Springs, Summit Hill, Versailles, Harrison township—Na-

trona village, Aliquippa, Canton—sewage disposal plan in one year, Coaldale, Kane, Marcus Hook, Big Run, Forest City, Chartiers township.

The rejected sewage disposal plan was for the Oxford Drainage Company of New Oxford.

The eleven places where plans for sewage treatment works were called for at once, are as follows:

Warren State Hospital, New Castle, Polk State Institution, Ellwood City borough, Derry, Indiana, Newport, Osborne, Indiana—second application, Shaler township—Glenshaw village, Butler.

Lower Merion township, Narberth borough, Harrisburg City, Dunmore borough, and Lancaster City, on first and second applications, are required to submit plans for sewage disposal works when called for by the Commissioner of Health.

The fifteen sewage disposal plans approved were for the following places:

Allegheny County Work House, Pittsburg—at filtration works—Aspinwall, York City, Bristol borough, Palmerton village, East Mauch Chunk—After modifications, Chambersburg, Carlisle, Allegheny City Home, Osborne, Washington, Greenville, St. Marys, Newport, Aliquippa.

The last three places need not build for three years and Greenville has two years time limit.

A private corporation, duly chartered by the State and to whom local authorities have granted a franchise for the construction, operation and maintenance of a public sewer system, is considered to be classed with the municipal corporation to the extent that plans must be filed and extensions approved. All other private corporations and companies and individuals that at the time of the passage of the Act, were discharging sewage into any of the waters of the State, may continue such discharge unless otherwise ordered. In a borough the remedy for these sources of pollution may be connection with a public sewerage system. All of the above matters more fully appear in the various permits herein arranged in alphabetical order.

ALLEGHENY, ALLEGHENY COUNTY.

Allegheny City Home.

This application was made by the City of Allegheny, Allegheny County, and is for permission to construct a new, sanitary sewerage system and sewage disposal works for the Allegheny City Home, located at Claremont Station, O'Hara Township, Allegheny County, and also for permission to discharge the effluent therefrom into the Allegheny River at a point on the institution's ground.

It appears that the Allegheny City Home is a municipal institution located on rising ground bordering the north bank of the Allegheny River in O'Hara Township, Allegheny County. The buildings are of the old regulation type, consisting of the central administration hall with wings to either side for male and female patients and other necessary buildings in the rear, and are so situated on the hillside overlooking the valley as to command a good view and admirable drainage. At the foot of the hill and near the buildings are the tracks of the West Penn Division of the Pennsylvania Railroad system. Beyond the railroad, extending to the river is a gentle, sloping, open field, used for cultivation of garden truck and other crops.

At the present time the Institution's population does not exceed four hundred and fifty persons. It is expected, however, that this may be increased to seven hundred in the future.

The sewage is now collected in a system receiving also surface and roof water and is conveyed by a twenty inch outlet pipe to the river where it is discharged at a point about fifteen hundred feet above the intake filter cribs of the Pennsylvania Water Company. These cribs are on the same side of the river as the said sewer outlet and the water which is drawn from them is the source of supply to a large population living in the series of municipalities bordering the city of Pittsburg and in the Turtle Creek Valley. Typhoid fever has been prevalent to an extensive degree in this district and the Commissioner of Health taking cognizance of this fact early in nineteen hundred and six notified the City Home authorities that sewage must cease to be discharged from the Institution into the river. No move having been made, in June of the current year a forceful request was again presented to the local authorities, resulting in an appropriation for the construction of the sanitary improvements now under consideration.

The average daily amount of sewage now produced at the City Home has been measured to be one hundred and fifty-eight thousand gallons which is equivalent to a per capita of three hundred and fifty-one gallons. The maximum exceeds this by about twenty-five per cent. The sewage is purely domestic and very dilute.

It is proposed to so regulate the water consumption that the abnormal use will be obviated and that the average daily flow of sewage will not exceed ninety thousand gallons for the present population of the Institution.

Furthermore, it is also proposed to construct an entirely new sanitary system whose diameters will range from six to ten inches, into which pipes all sewage and house wastes will be discharged. The plans contemplate remodeling the plumbing fixtures within the buildings. Present sewers are to be used for roof and surface waters only.

And to complete the improvement, it is also proposed to construct sewage disposal works comprising preliminary treatment of the sewage in septic tanks followed by sprinkling filtration, sedimentation and possibly a germicide process as a finisher, all in structures of permanent concrete masonry and according to plans accompanying the application. The septic tanks are to be put in the front lawn between the Institution buildings and the railroad. The other structures will be erected on the field between the railroad and the river.

If the appropriation now available be found sufficient, the applicants intend to contract for a double septic tank, otherwise a half tank only will be built at once. This half—a seventy thousand gallon receptacle—is equivalent in capacity to a twelve hour displacement with fifty per cent. increase over present sewage output from the Home. The full plan is equivalent to twenty-four hour displacement under same conditions. So it is clear that ample provisions will be made for subsidence and the maintenance of minimum velocities necessary to promote the most efficient septic action.

For the full plan there are to be duplicate tanks set side by side, being over all seventy-two and five-tenths feet long by thirty-seven and five-tenths feet wide, of concrete masonry roofed over below the surface of the ground to admit of the top being covered with loam and sod.

The sewage is to enter and leave the tank at the same end, which end is deeper—about eleven feet to flow line—and here drains are provided to permit the emptying of each half tank and each corresponding grit chamber of its liquid or solid contents and conveyance by an eight inch pipe onto the garden land below the railroad, where a proper disposal into the soil is presumably to be effected. This emptying will not be frequent, according to expectations.

Along the outer sides there is to be an eight foot compartment, seventy feet long, in each tank, down which the sewage, after having been screened and passed through the grit chamber, is to flow, returning to the front end in an eight foot wide fifty-one foot long inside compartment in each half tank, to one common syphon chamber for both said halves. This chamber is to be eight feet long and seventeen feet wide and about nine feet deep and in it will be installed a six inch syphon to automatically discharge a dose of eight thousand gallons, each time the chamber is filled, through an eight inch cast iron pipe leading under the railroad to the sprinkling filter below and adjacent thereto. The syphon is set to draw eight feet, but in case it should not work a six inch overflow pipe is provided in the chamber for safety. The elevation of the flow line in the tanks is controlled by the outlet pipe from them to the syphon chamber. This pipe is eight inches in diameter, is submerged about three feet deep and connected by a quarter bend with the horizontal pipe leading to the chamber. The elevation of the invert of this horizontal outer compartments. However, a center wall divides it into two equal parts, sewage is to be received and screened, and then by means of gates, at the piece is seven hundred and fifty-three and six-tenths feet, so that the flow line in the tanks cannot be less than this. The elevation of the top of the sprinkling nozzles, which are six inches above the surface of the sprinkling filters is seven hundred and forty-three. The bottom of the syphon chamber

is elevation seven hundred and forty-five and five-tenths so that it appears during the dosing of the sprinkling filters there will be a head thereon from two and five-tenths to ten and five-tenths feet or thereabouts.

Ordinarily there will be an air space of twelve inches only between the flow line and the roof of the septic tank. This will be reduced by floating matters upon the surface. To prevent the accumulation of gases numerous ventilator pipes one and five-tenths inches in diameter are provided to extend from the interior of the tank to the surface of the ground.

The grit chamber has the same dimensions as the syphon chamber and is placed in front of the latter at the end of the double tanks between the two outer compartments. However, a center wall divides it into two equal parts one for each half tank. Said wall supports a concrete trough eight feet long and about three feet wide and deep provided with a slanting bar screen placed near the outlet of the ten inch main sewer into which the Institution's sewage is to be received and screened, and then by means of gates, at the bottom on either side, the flow may be delivered at will into one or the other or both of the grit chambers below. Accumulations may be removed from these chambers into the main eight inch drain to the garden lands. Numerous man-hole covers, however, are provided over each chamber and tank to admit of inspection, repairs and operation. The design is such that although the tanks are to be placed in the front lawn in a conspicuous position, their existence there will be hidden from view below the ground and by careful maintenance, no trouble or annoyance should be experienced thereby.

The filter comprises an average depth of six and one-half feet of graded broken stone, either limerock or gray slag material, ranging from diameters of five inches at the bottom, to three-quarters of an inch at the top, resting on concrete floors and being contained by concrete walls forming in its entirety a bed forty feet wide and one hundred feet long.

The eight inch pressure pipe from the septic tank is to extend about mid-depth longitudinally through the filter. It is provided with a blow-off into one of the filter effluent channels. Off of this delivery main are to be taken three inch horizontal lines ten feet from and parallel to each other, supplying two inch risers located on ten foot centers over the entire surface of the bed. Each riser is to be fitted with a sprinkling nozzle arranged to be taken off and the riser plugged if necessary. No valve is provided for the system of distribution in the filter bed excepting where the main enters the bed. The adjustment of the volume of sewage to the requisite area is to be accomplished by the regulation of the number of nozzles that should be used.

The underdrainage system comprises channels extending across the width of the bed, parallel and ten feet apart, making in all ten of them, each at the bottom of alternate ridges and valleys, and each to be six inches in diameter, covered with brick set flatwise with spaces between of one and five-tenths inches. Each channel is to extend through the side walls into an outer compartment, walled up to the heighth of the filter bed surface and containing in its bottom the effluent channel. This compartment is two and one-half feet wide and one hundred feet long on each side of the filter bed, and is provided to admit of ready cleaning of the underdrained system and at the same time to protect the filter beds from the underdrains. The distributing pipes are to be connected up with a two inch pressure water pipe to admit of thorough flushing when necessary.

The effluent from the sprinkling filter is to pass into a concrete settling basin located at the end of the filter where a storage capacity of two hours flow or more will be provided. The basin is to have two compartments, or in reality it is to be one tank forty-seven and five-tenths feet long by twenty feet effective width, separated by a wall into two compartments. The depth at the inlet below flow line is to be two and five-tenths feet and at the outlet three and five-tenths feet. The liquid will pass out at the surface through an eight inch pipe and the solids may be drained through the same pipe into which the liquids discharge, either onto the surface of the ground in the field or into the existing twenty inch sewer outlet into the river.

Alternate locations of the sprinkling filter and settling basin layout are proposed. One is immediately below the railroad and the other two-thirds away across the fields to the river. Either would be satisfactory since first class maintenance of the works is to be required.

The intention is to receive bids for the entire filter bed, but if the appropriation will not admit, then seventy feet only of the entire hundred foot filter is to be constructed now.

Provided sufficient purification be not effected then the petitioners will install a germicide coagulant plant to give adequate results. The plans submitted show chemical dosing apparatus.

The layout in general is similar to that approved by the State and now being constructed at the Allegheny County Work House nearby. Some of the features thought worthy of special comment respecting the county work house plant are involved in the plant now under consideration. Especially important is the

feature with respect to the distribution of the septic sludge and sewage on the field where crops are to be grown. The danger of infection of food stuffs by sewage spread broadcast over the ground during the growing season is possibly always present and renders important as a health precaution that such disposal should be preferably at times when food stuffs are not grown. The solid particles remaining upon the surface of the ground should be plowed in before crops are grown.

With respect to the purification obtainable, it may be well to leave the matter open for trial and demonstration. The plans proposed are well conceived. If the works be operated carefully and effluent may be produced sufficiently purified to be discharged into the river at this time since raw sewage is emptied into the stream at many points above. However, no septic sludge or liquid either directly from the tanks or from the distributing system at the filter beds should be discharged into the outlet sewer into the river or into any ditch directly or indirectly connecting with said outlet sewer. Such liquid and solid matter should be disposed on absorptive areas at times when the liquid portion thereof will percolate into the ground. The solid matter should be ploughed into the soil or after sufficient drying, be otherwise disposed of in a sanitary manner without prejudice to public health.

Furthermore, the drainage of the accumulations in the settling basins should not be into the river as now provided. The solids should be intercepted on a drying area and subsequently be destroyed by fire or otherwise.

It has been determined that the interests of the public health demand that approval be given and it is hereby and herein given for the proposed sanitary improvements under the following conditions and stipulations:

FIRST: That the proposed plant shall be built under the direction and supervision of the designer or some other engineer equally skilled in the construction of sewerage and sewage disposal works, and that the plans of the works as built shall upon completion of the same, be filed together with such other information in connection therewith as may be required, in the office of the State Department of Health.

SECOND: That the proposed separation of sewage from all roof and storm water shall be effected before the disposal works are put in operation.

THIRD: That the contents of the septic tanks and grit chambers when emptied by gravity, shall be drained onto the surface of the ground on the fields, where precautions shall be taken to prevent its passage into the river. During the growing or harvest season, such disposal is prohibited and sewage or sediment should be ploughed in before any crops are grown on the field.

FOURTH: Raw sewage from the sprinkling filter and the accumulations in the settling basins shall not be discharged directly or indirectly into the outlet drains of the river or into the river itself. The suggestions hereinbefore mentioned respecting this matter shall be heeded.

FIFTH: From time to time the Department will make examinations and tests of the plant, and to facilitate this work reports of the operation of the work shall be made by some competent employee of the Institution, which reports must be made upon blank forms to be suggested by the Department.

SIXTH: Should the plant become outgrown at any time or require repairs in the future, such alterations or changes shall be made as the Commissioner of Health may suggest or approve. The operation of the plant shall at all times be subject to and conducted in accordance with directions of the Department of Health and in accordance with such other conditions as said Department shall from time to time determine as being to the best interests of sanitary requirements in the Allegheny River valley.

Special attention is called to the care necessary to be exercised, if furnace slag be used as the filter material, in selecting the material of proper consistency and of putting it in place free from dust or fine pieces which are quite liable to accumulate in handling.

Harrisburg, Pa. November 2nd, 1907.

ALIQUIPPA, BEAVER COUNTY.

This application was made by the borough of Aliquippa, Beaver County and is for the permission to install a public sewer system in said borough.

It appears that the borough of Aliquippa is located on the west bank of the Ohio River in the southeast part of Beaver County about twenty miles below Pittsburg and about five miles above Rochester, where the Beaver River enters the Ohio River and on the Pittsburg and Lake Erie Railroad. The incorporated territory comprises a comparatively level plateau of about two hundred acres, elevated about seventy feet above the low water of the river and lying between the hills and the river. The area averages one-quarter of a mile in width and stretches along the river for one and five-tenths miles. On the north is Moon Township and on the west and south Hopewell Township. The railroad is located at the foot of the hills and the town is built between it and the river.

A marked characteristic of the topography of the borough site is that the banks of the Ohio on one side and the slopes of the hills on the other side form a basin out of which surface water drains naturally either north or south in water courses paralleling the river for some distance. The most important of these courses is called McKees Run. It rises on the hillside a short distance west of the borough line and comes down into the borough and then passes southerly out into Hopewell Township where it receives the flow of another stream known as Jones Run and from this point of confluence passes easterly to the Ohio River at the southerly borough line. It drains about one-third of the municipal area.

Jones Run rises in the uplands about one and a half miles back, drains a sparsely populated territory wholly in Hopewell Township and comes down the river valley in a gorge through the hills which is narrow and several hundred feet deep.

North Run is the name of the water course draining the northern portion of the municipal basin. It is a dry ditch wholly within the borough on the flats and enters the river at the extreme northern part of the borough where there is any occupied land between the railroad and the river, but not literally at the northern boundary because the last one thousand feet of the town along the river is occupied by the railroad and it only and the run nowhere crosses the railroad location although numerous hillside ravines deliver water under the tracks through culverts to the run when there is any rainfall.

The industrial plants which have built up and supported the town are the Crucible Steel Company of America, employing two hundred and fifty men, the Kidd Brothers and the Burgher Steel Wire Mill employing one hundred and fifty men, the Vulcan Crucible Steel Company employing one hundred and twenty-five men, and the Russell Shovel Works, employing about forty men. Recently the Mutual Union Brewing Company has erected a large brewery, not yet completed which employs about seventy-five men.

By far the greatest industry of all effecting the interests of Aliquippa is the plant of the Jones and Laughlin Steel Company of Pittsburg which is being erected in Hopewell Township from the borough line southerly for a distance of four and a half miles along the river. The present construction is confined to the vicinity of the borough. In Aliquippa about one-half of the corporate territory west of the railroad is owned by said Steel Company and is to be used as a freight yard, so it is reported. As might be expected a real estate boom is on in the town.

The present population is reported to be about one thousand, in nineteen hundred it was six hundred twenty, and in eighteen hundred and ninety the village was part of the Township of Hopewell. Many of the mill employees are foreigners. Most of the houses are frame structures, there are no paved or macadamized streets in the borough, but the streets have been graded.

Pools of surface water are common in the street gutters. Cement side walks are about to be laid down on an extensive scale and as soon as public sewers are built, the streets will be paved, so it is reported. There are one hundred acres in the borough that cannot be built upon because they are occupied by the mills and the brewery etc. If the remaining one hundred acres in the borough were built up and occupied an average density of population of fifty per acre the maximum growth within the now existing boundaries would be five thousand.

The Jones and Laughlin development will, when completed, give employment to approximately ten thousand men. This Company has purchased land back from the river in the valleys of the small streams coming down from the hills and uplands in Hopewell Township. The Company has already erected about forty dwellings up the Valley of Jones Run. These houses are for laborers and the yards are provided with privies and vaults built of plank. The ground is porous and some of the vaults are within fifteen feet of the Run. Kitchen drainage is to be discharged into the Run. Numerous other settlements for laborers will be built in similar valleys. Just what the development will mean to Aliquippa is problematical, but undoubtedly a material increase in population will result.

It appears that the public water supply is furnished by the municipality. The brewery uses borough water for all purposes. All the other industries use either river or artesian well water for manufacturing, and with one exception—the Vulcan Crucible Steel Company—they use artesian well water for drinking purposes. The Vulcan Company takes borough water.

The soil in the borough is of an alluvial deposit, resting upon rock, possibly one hundred feet below the surface. There are reported to be about fifty driven wells in the borough whose depths vary from fifty to ninety feet. Some of the wells are shallow dug ones, and since there are over three hundred privies with loose vaults and some cesspools, it would not be surprising in bacteriological tests of the ground water showed some of it to be subject to contamination.

The Department does not have plans and a report of the municipal water works system. The borough built the works in one thousand nine hundred and four and operates them. The supply is taken from four driven wells,

sunk to the depth of about twenty-eight feet into the gravel bar located opposite the mouth of McKees Run on the shores of the Ohio River and distant from the bank between two hundred and fifty and four hundred and fifty feet. The stream here from bank to bank is seventeen hundred feet wide, and the said gravel bar at low water stage, which is reached once every twenty years possibly, is one thousand feet wide and all exposed. However, when Federal Dam Number Five is put in commission, which will be during the latter part of the current year, the bar and the driven wells will be permanently submerged to a depth of about seven feet. This dam is located at Freedom four miles below, and the pool formed by it extends up stream a little over one mile beyond Aliquippa to Dam Number Four located at Legionville. From these wells the water is pumped into the pipe system of the town, the surplus overflowing into two steel tanks located side by side on the slope of the hill just outside of the borough line. The combined capacity of these two tanks is two hundred thousand gallons. The street system comprises two and twenty-two hundredths miles of pipe. With this system there are one hundred and fifty connections, totaling about seven hundred consumers. For all purposes about three hundred and ninety thousand gallons are used daily, of which about three hundred and twenty thousand gallons are consumed by the brewery. It is reported that the system cost eighteen thousand dollars, and the gross annual income from water charges is about four thousand dollars.

The results of a chemical examination of the town's supply made of a sample collected in July one thousand nine hundred and five represents a medium soft water of fairly good purity.

Owing to the nonexistence of a board of health, the Department is uninformed relative to typhoid fever in the community but from verbal reports, the disease appears to have been rare.

The main street of the borough runs parallel with the railroad and in it from the summit at Third Street which extends from the passenger station to the river bank, a public combined sewer was laid by the borough about eighteen hundred and ninety-seven. That part of the sewer south of Third Street discharges into McKees Run opposite the brewery and that part of it north of Third Street discharges into North Run at Kidd Brothers and Burgher Steel Mill. This outlet is an eighteen inch pipe and the former is a twenty-four inch pipe. At Third Street each sewer is reported to be twelve inches in diameter. The drains were designed to receive storm water and sewage but it is reported that the pipes were not laid deep enough to serve cellars along the street and that in consequence very little if any, sewage is discharged into these conduits. The indications at the outlets are that some sewage finds its way into the pipes.

The mills are all in the north part of the borough. The said Kidd Brothers mill abutts the railroad and the waste water therefrom is discharged into the ditch which is the source of North Run. The volume of this discharge is small. Into the ditch the overflow of the large privy vault must go whenever the vault is full which was the case on the day of the Department's inspection. The sanitary appliances at the office are connected with a percolating cesspool on the property. The artesian well is distant several hundred feet.

The other industrial plants are on the banks of the river excepting the brewery. Named in order from First Street and the Kidd Brother's Mill down stream, they are Vulcan Crucible Steel, Russell Shovel and Crucible Steel Works. The waste water from each is discharged through pipes into North Run. Each has a large privy for workmen, the location of which is on the bank of the river, so arranged that the excrement must eventually be washed into the stream.

At the Vulcan plant a sewer leads from the office to the river.

Along River Avenue there are said to be a number of private residences from which kitchen drainage is discharged through a pipe leading from the property to the river.

The brewery is located between the railroad and Main Street. It is one of the largest establishments in the State. There is a twenty-four inch drain from it into McKees Run, and from this point, two hundred feet only of the Run is within the borough limits, excepting at the mouth thereof. The drain discharges sewage, rinsing water and spent liquids from the manufacture of beer.

On May fourteenth, one thousand nine hundred and seven, a complaint was entered with the State Department in regard to the nuisances existing in McKees Run for its entire length resulting from the brewery waste in said Run. The Mutual Union Brewing Company expressed a desire to abate this nuisance and will do so as soon as the local authorities provide proper sewerage facilities which said company represents were promised by the borough to induce the company to locate the brewery in the town.

It appears that of the three hundred and twenty thousand gallons of water used daily by the brewery, about sixty-one thousand two hundred gallons are consumed in the boiling for steam making, six thousand two hundred

and fifty gallons for ice manufacture and one hundred and sixty-eight thousand four hundred and eighty gallons for condensing purposes, the latter being discharged into the drain. Also fifty thousand two hundred and twenty gallons daily are used in the manufacture of beer, so that the remainder of thirty-three thousand eight hundred and fifty gallons constitutes the bulk of the sewage, wash water and spent liquors from vats which causes the trouble in the Run. The yeast which is washed from the kettles after beer has been drawn off from them and flushed through the sewer into the Run is the principal cause of the ill smelling deposits along the banks of McKees Run. Probably the entire bulk of this waste is not large and if it were washed out in cold water into a small tank and the solids collected there and properly disposed of, the overflow might go to the Run and eventually to the public sewer which is to be provided, without causing a nuisance. Certain it is that these deposits would be liable to sensibly affect the operation of the sewage purification plant, provided the volume of town sewage were small. Attention to the grading and widening of McKees Run and the removal of some of the pools there would improve conditions and reduce the nuisance.

The site of the Jones and Laughlin operations along Jones and McKees Run between the railroad and the river was formerly a railroad amusement park, the station being known as Aliquippa Park. Here numerous pavilions, restaurants, etc., were in existence and sewers from them extending to the runs at the time of the change in ownership. Now the buildings and sewers are in use by said steel company. Offices and a large dining room are maintained here. Said Company is constructing a ten foot culvert to take the place of Jones and McKees Runs from the railroad to the river. A small section of it only has thus far been built. It will become a sewer and the sewage will be deposited into the river about nine hundred feet up stream from Aliquippa's driven wells and the public supply unless all sewage be kept out of this natural water course. If a small sewer pipe were constructed in the walls of this culvert, the cost would not be increased and these pipes could be used in the future for the conveyance of sewage proper, and thus simplify the question of sewage disposal on the Jones-Laughlin properties.

At the present time the mouth of McKees Run is immediately above the town's driven well system and thus menaces the supply to a greater or less extent.

The proposed sewer system provided only for the territory occupied by dwellings between the railroad and the river, so north of First Street where the steel mills are, no provision whatever is afforded in the plains for a different disposal of the sewage than now prevails there. However, there is no public street in this tract and it may be that the local authorities intend that the mill owners shall provide their own sewer connections to the public system if there be any such made; but since the sewer plan makes special arrangement for the drainage from the brewery, it should be comprehensive enough to take the sewage from the entire municipal territory.

The plan shows two sewer outlets, both into the river down stream from the town's driven well system. The first outlet is to be thirty-six inches in diameter in Fifth Street, from the railroad and it is to be used to intercept the flow of McKees Run at this point. The lateral sewers served by this main are to receive sewage only, their sizes are to range from eight inches to fifteen inches in diameter and all of the territory south of Third Street is to be served thereby.

The other sewer outlet is to be twenty-four inches in diameter at the foot of First Street and it is to be used to intercept the flow of North Run from the culvert at the railroad. The lateral sewers served by this main are also to range in sizes from eight inches to fifteen inches in diameter and be used for the conveyance of sewage only.

The reason for making the outlet sewers combined is not apparent.

With a sewer system taking both sewage and storm water, the cost of treating the total flow of the sewers would be prohibitive. It nowhere appears that it is necessary in this new system to mix rain water with sewage.

At Freedom just above the site of the new dam is the intake of the Freedom Water Company, a subsidiary company of the Beaver Valley Water Company. Farther down stream at Beaver there is a municipal water works system obtaining its supply from the Ohio river. The sewage from Pittsburg, Allegheny City and of numerous municipalties on the Ohio river, and its tributaries above and below Aliquippa is discharged into the waters of the State and thereby menaces the health of the people who derive their drinking waters from the Ohio river. The interests of the public health so far as Aliquippa's driven well system is concerned demand that no more sewage shall be discharged into the river and that what is now emptied into the river shall be diminished in volume as rapidly as may be found practicable. Modern works for the treatment and purification of town sewage have been perfected to the extent that it is only a question of time when all municipal sewage must be treated before being discharged into the stream. Hence, in common with other municipalities, Aliquippa's sewers should be laid out in contemplation of a treatment plant. This also obtains with the Jones-Laughlin enterprise and the private sewers and other sources of river pollution in the borough.

If it is true, as reported, that the assessed valuation of the borough is seven hundred and forty-five thousand nine hundred dollars, the present constitutional limit of indebtedness is in round numbers fifty-two thousand dollars, which will be rapidly increased if the borough develops as anticipated. With a present indebtedness of twenty-nine thousand dollars, it appears that there is a margin of twenty-three thousand dollars which, with the sum of five thousand dollars already appropriated makes a total of twenty-eight thousand dollars in round numbers which may be devoted, if the electors so decide, to purposes of sewerage. The bids for the proposed sewer system were received in January, the lowest being about fourteen thousand dollars, and four others were in the vicinity of seventeen thousand five hundred dollars.

Probably the borough will not grow northward because of the topography. Residential neighborhoods may be developed on the uplands in Hopewell township or in the valleys of the Run, which developments may be largely dominated by the Jones-Laughlin Company. This concern has the problem of sewage disposal to deal with independently of the borough, but there may be a community of interest best served by co-operation. It is possible for the borough to receive the Jones-Laughlin sewage and treat it under some prearranged adjustment of cost, or it is possible for the private corporation to build its own plant and treat the sewage from its own sewer system and from that of the borough.

Whatever is finally decided upon, efficiency and economy demand that storm water shall be kept separate from sewage. The cost of treating the two together is prohibitive. So all the sewers whether built by the municipal or private corporation should take this into account.

The question of a site or sites for the purification plant is paramount and should be determined upon at once and the sewer system designed to conform thereto. The grades in the town are such that sewage may be conducted by gravity northerly through the valley of the basin to a point near the mouth of North Run, where disposal works can be built and possible the works could be reached by gravity. However, the cost of doing this would involve an expenditure greater than the borrowing capacity of the borough at this time. Should the anticipated growth materialize, the resources of the municipality would be great enough in the near future to admit of the installation of the sewage disposal plant. Temporarily the sewage would be discharged at the mouth of North Run. The details of this or some other plan comprising the collection of all the sewage of the borough and its ultimate purification should be worked out forthwith and submitted to the Commissioner of Health for approval. In this work the borough need the services of an expert engineer skilled in the design of sewage purification plants to assist the borough engineer.

It has been determined that interests of the public health demand that a permit be granted and it is hereby and herein granted to the public authorities of the borough of Aliquippa to install a system of strictly sanitary sewerage under the following conditions and stipulations:

FIRST: That roof, street and all storm water drainage be excluded from the system, and that no existing sewers shall be incorporated into the new system and that before any sewers are built a comprehensive plan of a sewerage system for the collection of the sewage of the entire borough and its conveyance to a sewage disposal plant, together with outlined plans of disposal works shall be prepared by the borough and submitted to and approved by the Commissioner of Health.

SECOND: That the plans for the sewerage and sewage disposal works to be submitted will be approved, modified or amended, and if the interests of the public health demand it, the Commissioner of Health may grant permission for the temporary discharge of sewage from such system into the Ohio river, and fix the time and conditions under which the sewage disposal works shall be built.

With respect to the brewery nuisance the borough authorities are hereby advised to remove or cause to be removed the obstructions in McKees Run in order that the brewery drainage may reach the river in the shortest time, or so much of said drainage as may continue, to go into said run from the brewery until a public sewer is provided therefor.

The local authorities are also hereby informed that the Commissioner of Health has advised the Mutual Union Brewing Company to provide a settling tank for the interception of the solids which now pass out with the liquid into the run and deposit there to subsequently decompose and cause a nuisance. When the public sewer system is put in operation it may be found necessary before admitting the spent brewery liquids to provide some preliminary treatment at the brewery plant before such liquids be admitted to the public sewer system and later to the sewage disposal works. Therefore, the proposed intercepting tank might well at this time be designed for permanent use if the borough's expert, who should be engaged to work out the outlines of the sewage disposal plant, should, on examination at the brewery, find this to be desirable and the State Department of Health consider it necessary.

The local authorities are still further informed the Commissioner of Health has notified the Jones-Laughlin Company that the law prohibits the discharge

of any sewage by any private individual, company or corporation into any of the waters of the State and that some plan must be devised by said company for the collection and treatment of sewage produced on its properties in Hopewell township, and that existing sewage discharged into the streams there must cease. The Department will gladly advise with said company in the matter of plans for the most efficient and economical sewerage works and for the supply of water to the public on its properties and in the vicinity thereof.

With respect to the manufacturing plants within the borough, it has been determined that each and every one of the owners thereof be notified of the desirability of a general sewerage system in the town with which each plant should be connected in order that cesspools and privies may be abandoned and all sewage removed in a sanitary manner through pipes designed expressly therefor to the public sewerage system.

The borough council is hereby notified that plans of the municipal water works system and a report thereof must be submitted to the State Department of Health within thirty days from the date of this permit or the penalty provided by law for failure to file such plans and report will be exacted.

The borough authorities are advised to effect an abandonment of dug wells in the borough which may be polluted by surface or subsoil drainage.

It is suggested that the borough officers and representatives of the Jones-and Laughlin Company and the Mutual Union Brewing Company name some early date for the conference with the Commissioner of Health at Harrisburg relative to sanitary affairs of possible mutual concern.

Harrisburg, Pa., July 25th, 1907.

ALIQUIPPA, BEAVER COUNTY.

This application was made by the borough of Aliquippa, Beaver county and is for approval of plans for a comprehensive system of sewerage for the collection of sewage of the entire borough and for its treatment in compliance with the terms of a permit issued by the Commissioner of Health to said borough and bearing date of July twenty-fifth, nineteen hundred and seven, in which it was stipulated as follows:

"That roof, street and all storm water drainage be excluded from the system, that no existing sewers shall be incorporated into the new system and that before any sewers are built, a comprehensive plan of a sewerage system for the collection of the sewage of the entire borough and its conveyance to a sewage disposal plant, together with outline plans of disposal works shall be prepared by the borough and submitted to and approved by the Commissioner of Health."

It appears that since the Department's last inspection of the borough, a project has been developed by the Pittsburgh and Lake Erie Railroad for the acquirement of all of the lands in the borough west of the Pittsburgh and Lake Erie Railroad and for the utilization of these lands for freight yard purposes. Dwellings now erected in this part of the town are to be torn down and, therefore, the necessity for providing sewerage for this district which extends the whole length north and south of the borough is obviated.

The proposed sewer system is designed to afford sewerage facilities to all of the occupied territory in the borough east of the said railroad tracks south of First Street, which is the boundary between the business and resident section of the borough and the land occupied by the industrial plants. North of said First Street the territory is occupied by the Vulcan Crucible Steel Company, the Russel Shovel Company, the Crucible Steel Company of America and the Columbia Enamel Brick Company. The proposed sewers will have an outlet main fifteen inches in diameter, laid in the river road north from First Street by the properties of the first two named companies and practically to the land of the Crucible Steel Company of America. Hence since this outlet sewer for the entire sewerage system will be laid about twenty feet deep in the river road, known as Beaver Avenue, it will be available for use to serve the said three companies. Therefore, the proposed system is adapted to afford sewerage facilities to the entire borough excepting a narrow strip of land between the railroad and the river in the extreme northern end of the borough. Here the land is unoccupied. When developments occur the sewer problem will be wholly local.

On Beaver Avenue there is a tract of land between it and the river, approximately three hundred feet long by one hundred and ten feet deep from the top of the river bank which is about the east line of Beaver Avenue to the low water mark or harbor line, (said tract being opposite the Russel Shovel Company's land) upon which the borough purposes to locate the sewage purification plant comprising septic tanks, and contact filters, and outlines of the works are submitted.

The elevation of Beaver Road here is one hundred and forty, assumed datum, and the elevation of low water seventy-five. The elevation of the highest water line at this point was one hundred and ten, which occurred on March fourteenth the current year.

The petitioners purpose to erect a high masonry wall along the harbor line and carry it up to the elevation of this freshet mark and to fill in back of this wall with suitable material to form the foundation for the sewage disposal works. The outlines submitted are sufficient to show that it is possible and feasible to erect sewage works at this place. Land is available north and south of the proposed tract upon which extensions of the plant first erected may be made when required.

In view of the fact that the borrowing capacity of the municipality at this time is insufficient to pay for the cost of the installation of the proposed sewer system, and for the cost of installing disposal works besides, it has been unanimously agreed that the interests of the public health demand that approval be given to the proposed sewer system, and that a permit be granted for the temporary discharge of the sewage from said system into the Ohio river at the point proposed, which approval and permit are hereby and herein granted under the following conditions and stipulations:

FIRST: This permit to discharge sewage into the Ohio river shall expire on July first, nineten hundred and ten. If at that time, the terms of this permit shall have been complied with, then if the interests of the public health demand it, the Commissioner of Health may extend the time and fix the date on or before which the municipality shall construct approved sewage disposal works for the treatment of sewage.

SECOND: All storm water shall be excluded from the system. At the close of each season's work detail plans and profiles of the sewers built during the year, together with any other information called for relative thereto, shall be filed with the State Department of Health.

THIRD: The local authorities shall keep a record of all connections with the sewer and facts in connection with such connections shall be given to the State Department of Health when called for.

FOURTH: The borough shall abandon the existing combined sewers as carriers of sewage, shall effect a disconnection of all buildings therewith, and maintain these conduits, if maintained at all, independently for the removal of storm water only. The sewage from estates in the borough shall be conveyed to the public sewer system herein approved, and proper ordinances for this accomplishment shall be enacted by the borough.

FIFTH: If at any time in the opinion of the Commissioner of Health, the sewer system or any part thereof is a nuisance or a menace to public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may advise or approve.

SIXTH: No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

Harrisburg, Pennsylvania, December 4th, 1907.

BADEN, BEAVER COUNTY.

This application was made by the borough of Baden, Beaver county, and is for permission to install a system of sewers and to extend the existing sewers and to discharge the sewage therefrom into the Ohio river in the lower part of the borough.

It appears that Baden borough is a small purely residential community located on the hillsides and east bank of the Ohio river in the southeastern part of Beaver county, Pennsylvania. Its present population is about five hundred, and although the village has been in existence for at least two generations, the growth has been practically stationary. However, prospects for the future are that the population may be increased several fold. There is an effort being made by the citizens of the town to establish modern water works and sewage facilities and to induce real estate developments in the town. Baden is twenty miles down stream below Pittsburg, seven miles above the county seat of Beaver, and through it is being projected the trolley lines of the Pittsburg Railways Company, connecting Beaver Valley with the cities of Allegheny and Pittsburg. The said Railway Company has purchased its right of way through the borough by the payment of a sum of twenty-five thousand dollars in cash, which the local authorities are using to pay for the establishment of a complete system of public water works. An application for approval of this system is now being considered by the State Department of Health.

A further consideration required by the borough, is the improvement of State Street, the main thoroughfare in the town, by widening, straightening, grading, curbing and paving, at an approximate cost of two hundred thousand dollars. The brick pavement is being put down on a concrete foundation.

The municipal territory extends along the river for about a mile and a quarter and back there from an equal distance. A very great proportion of this territory is under cultivation. The village lies on the south of Tevebaugh Run, a stream rising about three miles to the east and coming down to the river through a ridge which parallels the river in the borough and is distant therefrom about two thousand feet. Its summit is in the neighborhood of two hundred and sixty feet above the river. On the slope from the summit to

the river bank and south from the valley of the said run, the built up portion of the towns is located. The future growth will be largely on the same slope southerly from the village limits as now built up. There may be a development north of the run but there is not much over one-third of a mile to the borough line.

Kitchen drainage is usually deposited on the surface of the ground or discharged into street gutters. On most of the estates privies are provided over earth vaults lined with plank or masonry but they do not have tight bottoms. Therefore, some percolation into the surrounding ground through the walls and at the bottom occurs. The local authorities require vaults to be cleaned out when they become filled to within two feet of the surface. In the past the custom has prevailed of digging new vaults when the old one became filled. The new ordinance has been established to obviate this custom. The night soil will be removed to farm land in the borough.

The present water supply is obtained from dug wells, cisterns and springs in the borough on individual estates. This part of the county is in the lower productive coal measures. Coal veins outcrop in the slope between the summit of the ridge and the river in the borough. The dip is towards the river and hence ground waters appear at the surface where impervious strata terminate on the slope. Therefore, numerous springs abound, especially in the valleys of the little streams coming down the hillside to the river.

The dug wells are shallow, are sunk in the shales and the geological structure is such that seepage from the privy vaults might easily contaminate the well supply. Some of the springs are located below privy vaults and hence they are also liable to sewage pollution, either from surface or underground passages. So far as the Department is informed Baden borough has not been afflicted with a typhoid fever epidemic. Cases of the disease have occurred, but their origin is unknown. However, it is clearly apparent that attention should be paid to both the water supply and the disposal of sewage in the borough.

The municipal project under consideration for water works comprises a series of driven wells on the banks of the river or along its shores, a pumping station, stand pipe and water pipe system, extensive enough to reach all the dwellings in the village. No charge of water rate is to be imposed upon the consumer. He is to be furnished what water he may need, and the cost thereof is to be defrayed by general taxation. Owing to this somewhat unique apportionment of costs of operation, the individual will be likely to avail himself of the advantages of the water works system. Already, without an exception, all dwellings have been connected with the system where water pipes have been laid. Hence, the consumption of water is to be universal and the enforced abandonment of the existing dug wells and springs will not work a hardship.

The water works system brings to the fore the problem of disposal of water from the household after it has been used for the inferior domestic purposes, and the local authorities with commendable zeal have laid out a comprehensive sanitary sewer system for the entire village, and at an election held therefor on the twenty-second day of June, one thousand nine hundred and seven, the project to bond the municipality in the sum of eighteen thousand dollars for general sewerage purposes was passed by a large majority.

It is reported that seven out of the thirteen negative voters have private sewers on their property.

The main line of the Pittsburg, Fort Wayne and Chicago Division of the Pennsylvania Railroad system passes along the banks through the borough and about forty feet above the river. East of the river is State Street, a public highway laid out by the Commonwealth in pioneer times, leading from Pittsburg to the west. Along this highway there are residences having private sewer connected to the river. One such sewer serving two dwellings has an outlet above the village. There are four such sewers in the village south of the passenger station.

The names of the owners of the sewers and the distances up stream of the outlets above the point on the shores of the river from the driven wells which are to supply the water to the public in the borough are located, are as follows:

W. J. Leese, one thousand four hundred feet; M. L. Strock, one thousand nine hundred feet; Calvin Blazier, two thousand feet; J. H. Dippold, two thousand two hundred feet, and Machesney's heirs, three thousand six hundred feet.

Immediately north of the passenger station about one thousand feet up stream from the proposed driven wells, is a natural rising on the ridge having several tributary runs in the village. Into this run at State Street, sewage is discharged from a twenty-four inch pipe which was built by the municipality and was in operation prior to the so-called "Purity Water Bill" of nineteen hundred five. The sewer has a lateral extension twelve inches in diameter up Bryan Avenue. It is reported about one hundred people are served by these two sewers. Both structures take street drainage as well as domestic sewage.

The proposed municipal system is to be strictly sanitary. All storm water will be excluded. A sewer is designed for every street in the borough between the ridge and the river. In State Street, two parallel sewers will be laid, one in each sidewalk. The purposes of this is to obviate interference with the permanent pavement of the streets. The sizes are to range in diameter from eight inches to fifteen inches and the sewage is to be collected at the mouth of the Tevebaugh Run and there discharged into the river at a point below the bar into which the driven wells have been sunk from which the borough's supply of water is to be obtained. Inspection manholes are to be provided at every street intersection and at changes in line of the sewer, the manhole covers are to be percolated to secure ventilation and at summit points on the sewers, flush tanks will be installed. All sewer joints are to be made water tight with Portland Cement.

There is a hard-pan under the bed of the river below which is a stream of water bearing gravel. This stratum prevails in the river valley and a number of municipalities along the stream take their water supplies from it. The proposed Baden supply is to be drawn from this stratum. The driven wells and the pipe connections will be submerged all of the time and any leaks in the piping or apparatus ill afford means for the entrance of river water into the public supply. While the underground water may be pure, there will always be a menace so long as the surface waters above it contain sewage. Vigilant inspection and maintenance of the wells and appurtenances may safe-guard the supply, nevertheless, the interests of the public health demand that the river water shall be kept as free from sewage pollution as may be practicable. Now during the summer months, the river reaches such a low stage that the bar where the said driven wells are located is often exposed for weeks at a time. But when the Federal Dam now nearing completion in the river, four miles below at Freedom, is put into commission, which will be during nineteen hundred and seven, the water level in the pool will be maintained at the nine feet stage, which will submerge the driven wells at last eight feet at all seasons of the year. Therefore, the danger of sewage contamination of the borough's supply will then be constant.

The State Department of Health is engaged in bringing about a discontinuance of the discharge of sewage into the Ohio river and its tributaries in Pennsylvania, not only for the protection of the public in Baden but also for the protection of the public in the municipalities further down stream in the State, whose water supply is obtained from the river. It is essential therefore, that the local authorities should safe-guard the borough's proposed supply of drinking water and that the sewerage plans should also contemplate protection in this respect to the municipal supplies further down stream.

It appears on report that the assessed valuation of Baden is in the neighborhood of three hundred and sixty thousand dollars, which is true, limits the municipal borrowing capacity to twenty-five thousand dollars in round numbers. It has at present a bonded debt of six thousand five hundred dollars. Therefore, with the sewerage debt of eighteen thousand dollars now authorized added, the town will have gone to practically the constitutional limit of indebtedness. It is evident then, that if sewage purification works are to be constructed out of this fund, a part of the sewer construction must be deferred or the cost of the sewers largely assessed on the abutting estates. Relative to this assessment, it may be noted that the question of a bond issue was submitted to the electors with the common understanding that the sewer system was to be paid for by the general taxation. It is apprehended, in this case, that should the borough council attempt to assess the cost of the sewers on abutting property, that the power to do this would have to be settled in a court of equity.

If the borough be permitted to build the sewers, this public improvement coupled with the water supply project and the permanent highway improvements afford inducements for a rapid growth in the borough. On the opposite bank of the river very extensive industrial plants are being erected which will give employment to many thousand men. Villages are springing up there and the impetus given must surely extend to Baden. A bridge over the river at this point, has been chartered recently and this structure will be erected by private capital and be used by the street railway lines and the public generally.

Every prospect points to Baden becoming an important and good sized town. The local authorities realizing the situation should be commended for foresight in planning public health utilities, like water works and sewerage, not only for the present but for the future. Lack of funds only prohibits the installation of sewage purification works at this time, but the petitioners represent that the municipality will be glad to devote its first available funds derived from increased valuation resulting from anticipated developments, to sewage disposal works.

Along the river at and below Pittsburg over one-half a million people discharge their sewage into the river. Permits for sewer extensions have in several instances been granted to some of these municipalities under the stipulation that treatment of the sewage shall be brought about in the near future. It would appear, owing to the geology and topography of Baden and the probability of a boom growth, that the interests of the public health would be

subserved and the cause of municipal sanitation advanced by the promotion of the proposed sewerage system. The amount of sewage to be discharged by it into the river for the first year or so will be an inconsiderable volume and will not measurably increase the pollution of the river. The point of discharge, however, should be into deep water and far below the borough's driven wells, where eddies or up streams currents cannot transport any of the borough's sewage to the site of the wells. The danger, if the borough supply were contaminated, would be liable to be much greater from a nearby sewer than from one remotely located.

The borough, however, should do away with every sewer outlet into the river within the municipal territory and the owners of the private sewers herein enumerated should be obliged to connect with existing sewer. Tevebaugh Run drains a water shed which is subject to these pollutions incident to a farming territory. However, on it there are gas and oil wells within the borough limits and adjacent thereto, which add their peculiar pollutions to the stream. These are not germain.

It has been determined that the interests of the public health demand that a permit be granted for a system of sanitary sewers under the following conditions and stipulations:

FIRST: That all storm water whatsoever shall be excluded from the system, that profiles of the proposed sewers be submitted, and at the close of each season's work detail plans and profiles of the sewers built during the year together with any information called for relative thereto, shall be filed in the State Department of Health.

SECOND: The local authorities shall keep a record of all connections with the sewer and monthly inspections of some officer of the borough shall be made and recorded, and facts in connection with these matters shall be given to the State Department of Health when called for.

THIRD: The borough shall abandon the existing public sewers as carriers of sewage, shall effect a disconnection of all buildings therewith and maintain these conditions independently for the removal of storm water only. The sewage from all the estates in the borough shall be conveyed to the public sewer system herein approved and upon the connection of each estate with said sewer system, the privy vault thereon shall be abandoned.

FOURTH: This permit to discharge sewage into the Ohio river is granted under the express stipulation that detail plans of the outlet, its location with respect to the driven wells of the borough and the bank and main channel of the river shall be submitted to and approved by the Commissioner of Health before the outlet is constructed. Attention is called to the fact that the Ohio being a navigable stream, is under the jurisdiction of the Federal authorities, and that a permit for the placing of any obstruction in the stream may be secured from said authorities.

FIFTH: This permit to discharge sewage into the Ohio river shall expire on July first, nineteen hundred and ten. If at that time the terms of this permit shall have been complied with and the borough shall have submitted plans of sewage disposal works for the treatment of all of the borough's sewage, then if the interests of the public health demand it, the Commissioner of Health may extend the time and fix the date on or before which the municipality shall construct approved sewage disposal works for the treatment of the sewage.

SIXTH: If at any time in the opinion of the Commissioner of Health, the sewer system or any part thereof, is a nuisance or menace to public health, then such remedial measures shall be adopted by the borough, as the Commissioner of Health may advise or approve.

SEVENTH: No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

The borough authorities are hereby advised and urged to effect an abandonment of all dug wells and all springs which may be polluted by surface or subsurface drainage, as soon as a public water supply of satisfactory quality shall have been afforded.

Harrisburg, Pa., July 25, 1907.

BEDFORD, BEDFORD COUNTY.

This application was made by the borough of Bedford, Bedford county, and is for permission to extend its sewer system and to discharge the sewage therefrom, untreated, into the Raystown branch of the Juniata river within the limits of the borough

Bedford borough, the county seat of Bedford county, is a substantial historic and slow growing municipality, of about twenty-three hundred population, located on the Raystown branch of the Juniata river, in the central part of the county and surrounded by Bedford township.

The river flows easterly through the northern part of the borough, nine-tenths of the municipal territory being south of the stream. That section north of it contains the Pennsylvania Railroad station. The J. L. McLaughlin Handle Factory is located here also. Besides the saw mills and the peanut factory,

and the stores for trading, there appears to be very little enterprise and the above industries, affording employment to possibly a hundred people do not foreshadow a boom. It is reported that the town has refused to encourage the location of large industrial plants in the vicinity. The chief sources of revenue are the natural resources of scenery, climate and mineral waters. Hotel accommodations are good and the place is a popular summer resort. People of fashion from Philadelphia and elsewhere frequent the town and also the famous Bedford Springs located one and one-half miles southerly in the valley of Shover's Run.

This run forms the easterly boundary of the borough. There is another stream which rises to the south of the borough and westerly of it in the mountains and flows northerly through the village in the western part thereof, crossing Pitt street and thence turning and flowing easterly paralleling Pitt street between it and the river and emptying into the latter just above the Richard street bridge. These two runs and the river afford good facilities for surface drainage. The site of the town is on a gradual slope back and up from the water courses.

The streets are reasonably broad, regularly laid out, house lots are of good size, and the dwellings have abundant yard space above them.

The borough owns and operates its own water works system. It was first built in eighteen hundred and seventy-two and was enlarged in eighteen hundred and ninety-nine and now comprises two small impounding reservoirs located on the mountain sides and fed by springs and brooks coming from uninhabited and heavily wooded areas, a storage reservoir fed by a spring on Gravel Hill in the borough, and a pumping station located on the banks of the Juniata river in the northwestern corner of the town. In the system also are about eight miles of distributing mains whose diameters range from two inches to eight inches. It is reported that there are no private wells or springs in use in the borough, everybody being supplied by the public water. It is also reported that the average daily consumption is one hundred and twenty-seven thousand gallons.

The total storage capacity of the reservoirs is twenty-nine million gallons. During seasons of protracted drought the supply is insufficient from these gravity sources and the local authorities are forced to resort to the pumpage of Juniata river water. There is a six-inch pipe intake by means of which the raw river water is delivered to a steam pump, capacity rated at five hundred gallons per minute. If reports be true this emergency supply has not been drawn upon for two years.

At the borough of Manns Choice is a tannery from which liquid wastes are discharged into the river at a point about seven miles above the Bedford water works intake. So far as the Department is informed this menace has been the subject of litigation which was dropped on the pledge of the tannery proprietors to keep the polluting matter out of the river. Complaint has recently been made to the State authorities about this menace.

Since there are no private wells or springs in the town it would appear that the necessity for sewers in the borough could have no connection with the preservation of the purity of any drinking waters. The underlying formation is limestone. Sixty-five cess-pools are reported to be located on as many private estates and to be used for the reception of household waste. The common shallow privy vaults abound. These methods and the public and private sewers have proven reasonably satisfactory to the citizens. The general health conditions in the borough in the past have been good.

There are reported to be seven private sewers to the river from estates abutting Pitt Street. There are three public sewers, they receive both sewage and storm water. The principal one is in Richard Street. It is fifteen inches in diameter, three thousand feet long and discharges into the river at the foot of said street. Juliana Street is next north of and parallel to Richard Street and in it there is a fourteen inch sewer fourteen hundred feet long with a short six inch connection from John Street, which empties into the run at the foot of Juliana Street. In Thomas Street which is next to and west of Juliana Street there is a twelve inch sewer one thousand feet long which empties into the run at the foot of said street.

The above bublic and private sewers serve about three hundred and fifty people in a district where there is a population of eight hundred. There may be other private sewers to the streams of which the Department is not aware at this time.

The borough proposes to extend the Juliana Street sewer from the present terminus at John Street southerly, a distance of about eight hundred and fifty feet. The object of this extension is to afford sewerage to the public school in which there are about five hundred and fifty pupils. There will be several private estates connected to this extension.

It is also proposed to build about six hundred feet of fifteen inch sewer in Pitt Street northerly to the Thomas Street sewer. It appears that there are several cess-pools overflowing into adjacent cellars and onto Pitt Street and the proposed sewer is intended to remedy this nuisance.

It appears that the present sewers have few street inlets and therefore receive a limited amount of surface drainage. Probably some storm water would be discharged into the proposed sewers.

The contemplated extensions are not a part of any comprehensive plan. It is evident that if cess-pools should overflow in other parts of the borough, or if the discharge of slow water into street gutters should require underground drainage to obviate some local nuisances, that the laying down of sewers by the piecemeal method instead of conforming to a general plan would be likely to prevail unless, meantime, a comprehensive sewerage system were devised and adopted by which to govern the size, slope and direction of the sewers.

Ultimate efficiency in the collection of the sewage of the entire borough and in the proper disposition of it dictates that a study of the problem of how best to collect and dispose of the sewage, should be taken up and settled immediately.

As soon as the proposed sewers shall have been built more than double the quantity of sewage now produced will be daily discharged by the public sewers into the Juniata River. This pollution of the stream, if permitted to increase would prejudice public health in all probability by ways which it is not necessary to herein outline. Sufficient it is that the Purity Water Bill, so called, of nineteen hundred and five, whereby the Commissioner of Health is directed to preserve the purity of the waters of the State for the protection of the public health, contemplates, not only the discontinuance of the discharge of sewage from existing sewers into streams where this is deemed necessary by the State officials, but that streams now pure, or nearly so shall be preserved in this purity. While Bedford borough should find it desirable to remove household wastes from the borough, it does not appear necessary that this should involve the pollution of State waters to the detriment of the rights of riparian owners along the river or to the menace of the health of man or beast who may use these waters.

The Raystown branch of the Juniata River rises in the Allegheny Mountains Bedford counties and flows easterly and northerly through Bedford and Huntingdon counties and joins the main Juniata River a few miles below Huntingdon borough. The area above Bedford borough is about one hundred and fifty square miles and comprises a mountainous district. In it there are three boroughs: Manns Choice already mentioned, having a population of about three hundred and sixty, Shellsburg borough, having a population of about three hundred and located about three miles from Manns Choice; and new Baltimore borough in Somerset County on Decters Run, eleven miles above Manns Choice.

Besides the tannery at Manns Choice there is danger of pathogenic infection of the river or its tributaries, not only from dwellings in the boroughs but from individual habitations in the rural districts. Consequently it is not safe for the river water to be used as a source of public supply at Bedford unless precautionary measures be taken to remove from the waters any infection that may be therein. Among such measures is the boiling of the water by the individual consumers and the filtration of the supply by the local authorities. However, neither of these measures is sufficient warranty for the wilful pollution of the stream, and the State Department of Health will have a sanitary survey made for the purpose of protecting the purity of said river above Bedford borough. It would be inconsistent for the State authorities therefore to permit the public sewers of Bedford to bring about a condition of the waters in the stream below Bedford which it is the intention of the Department to obviate above said borough.

Eight miles below Bedford on the river is the borough of Everett, and forty miles below Bedford, by the course of the stream, is the borough of Saxton. Both of these municipalities resort to the river for water, so it is reported, when the mountain sources which are used ordinarily to supply the towns become exhausted during protracted droughts.

During the last twelve months a State charter has been issued to the Raystown Water Power Company of Huntingdon, Penna. for the supply, storage and transportation of water and water power for commercial and manufacturing purposes in the township of Juniata, Huntingdon County and to the Penn Water Power Company for similar rights in Penn Township, said county. These charters involve the construction of two concrete dams, about forty feet high on the Raystown branch of the Juniata River, one about two miles above the mouth, and the other several miles further up. What sanitary protection, if any, to the waters of the river may be required or involved in the rights conveyed by these charters is not now known.

If it be true that the assessed valuation of Bedford borough is as reported seven hundred and sixty-four thousand nine hundred and five dollars and the bonded debt thirty-seven thousand dollars then the municipal borrowing capacity is in the neighborhood of sixteen thousand five hundred dollars a sum insufficient to provide for the purification of the borough's sewage by any permanent plan, but there appears to be no reason why the borough should not prepare a comprehensive sewerage plan involving future treatment of the sewage. It is well known that the treatment of sewage, both from the

standpoint of economy and efficiency, demand, in a case like that of Bedford, that storm water should be excluded from the sewers, the cost of works big enough to care for the volume of storm water is prohibitive.

A more thorough investigation of the uses of the river below Bedford is necessary before the final policy for the State can be well conceived with respect to the time when municipal sewage should cease to be discharged into the streams in this district.

It has been unanimously agreed that a permit be granted and such permit is hereby and herein granted for the proposed extension under the following conditions and stipulations:

FIRST: That on or before November first, Nineteen hundred and eight, the borough shall prepare a plan of sanitary sewerage and sewage disposal works for the collection and treatment of the sewage from the entire municipal territory and shall submit the same to the Commissioner of Health for approval.

SECOND: Permit to discharge sewage into the waters of the State herein granted shall cease on the first day of November, Nineteen hundred and eight, but if on said date the other terms of this permit shall have been complied with, then the Commissioner of Health may extend the time in which sewage may continue to be discharged into the waters of the State by said borough.

THIRD: Attention is called to the fact that the size of Pitt Street sewer may be reduced with perfect safety. Also that if the existing sewers are to be used as a part of the ultimate sewer system of the borough then admission of storm water to them should be under such conditions that when purification works shall have been built, if it be found necessary, surface water shall be excluded therefrom.

From the lessons taught by various typhoid fever and other water borne epidemics in Pennsylvania, a very grave risk is assumed whenever raw river water is introduced into the Bedford system. No better investment can be made by the local authorities than to prepare plans for the purification of such water from the river as it may be necessary to introduce into the system. The State Department of Health will be glad to advise with the local authorities relative to this matter and the Commissioner of Health will be pleased to arrange a date for a meeting at his office in Harrisburg.

Harrisburg, Penna., November 23rd, 1907.

BIG RUN, JEFFERSON COUNTY.

This application was made by the borough of Big Run, Jefferson County, and is for the permission to install a sewer system and to discharge the sewage therefrom, untreated, into a natural water course known as Big Run at a point within the limits of said borough.

It appears that the borough of Big Run is a manufacturing community of about one thousand population, situated in the southwestern part of Jefferson County on Mahoning Creek, six miles above and east of Punxsutawney, and also on the line of the Buffalo, Rochester and Pittsburg Railroad. It is of long standing, the village having been established about forty years ago as a lumber camp. At the present time the sole leather tanning works of the William Irvin Company, employing sixty-five hands, and a lumber mill operated by the same company, are the principal industries. There is also a grist mill, a planing mill and a range boiler works in the town.

The borough is bounded on the south by the Mahoning Creek, on the west by Big Run, which comes down from the north a few hundred feet within and east of the borough line, and on the west, north and east by Henderson Township. The territory round about is very hilly and largely under cultivation. Bituminous coal is mined in the region.

Big Run stream rises about seven miles above the borough and drains an area of twenty-one square miles, on which there are located three colleries in operation by the Rochester Pittsburg Coal and Iron Company. The miners live in the village of Eleanor, in McCalmont Township, which is a terminus of a branch of a railroad extending from Big Run borough. It has a population of about two hundred. Where the stream passes through Big Run borough, the presence of mine drainage therein is noticeable, both by the peculiar color of the water and by the characteristic yellow deposit on the stones.

Mahoning Creek rises in Clearfield County about twelve miles northeasterly and drains an area of eighty-five square miles, on which is the borough of Troutville and the borough of Sykesville, both small places, the latter being in Clearfield County. On this area there are at least eight more or less extensive mine operations and a total population of possibly four thousand, including fifteen hundred in and around the borough of Sykesville, six miles above Big Run borough.

Acid mine water is pumped or flows naturally into the stream. Below Big Run borough, Mahoning Creek follows a generally westerly direction across the southern portion of Jefferson County, northwest corner of Indiana County and through the northern part of Armstrong County, a distance of fifty miles to the Allegheny River, which it enters at the village of Mahoning, Pine

Township, said county. The greater portion of the territory traversed is sparsely populated, the only places of marked importance on its banks being the borough of Punxsutawney and Clayville, besides Big Run. They are from six miles to eight miles below the latter municipality and Mahoning Creek flows through them. In the year Nineteen hundred, Punxsutawney had a population of four thousand three hundred and seventy-five, and Clayville, two thousand three hundred and seventy-one, which populations have since been considerably increased.

Most of the coal mine operations in the valley of the creek are in the vicinity and on the watershed above these places.

At Big Run borough, above Big Run stream, the creek does not show evidence of acid pollution. Four or five miles above, however, where the flow is reduced, evidences appear.

At the eastern end of the borough, the creek is dammed for a height of about ten feet to hold the logs brought down for the lumber mills. Again near the middle of the town, there is a dam about six feet high used in connection with the water privilege at the grist mill. Below this dam the flow of the creek is quite rapid.

Between the borough and Punxsutawney there are fertile farm lands and some undergrowth. Along the banks where the land is flooded every spring, there is a dense growth of shrubbery which would seem to prevent cattle from having access generally to the waters. At Punxsutawney there is evidence of mine drainage by the usual characteristics. A private water company maintains a pumping station with an emergency intake into the creek in the vicinity of this place and water sometimes is thus supplied to the public for drinking purposes. The sewage from Big Run borough is thus a menace to the public in Punxsutawney whenever creek water is supplied.

Big Run borough is supplied by water from pipes owned by the Big Run Water Company, and the source is obtained from a reservoir on Clover Run, a tributary of Mahoning Creek, on the watershed above the borough, which reservoir and supply is owned by the Lindsey Water Company, so it is reported, and the supply main extends through the borough of Punxsutawney.

Much of the timber supplied to the said saw mill is obtained from the watershed of Clover Run, and on this shed above the reservoir there is a large mine being opened by the Clover Run Coal Company of Clearfield, a railroad is being constructed there and a mining village contemplated.

The inhabitants of the borough appear to rely largely on individual wells, mostly dug from six to twelve feet in depth and copious in amount. About one-third of the people take the public water, it is said. Some twenty houses in the town are supplied by a joint pipe line leading from a spring south of the creek, distant about half a mile.

The necessity for public sewerage, in the minds of the petitioners, is the necessity for adequate protection of the private well supply of the town.

In the absence of any public sewer system, individual pipes have been laid to the streams. There is some drainage of waste water to street gutters, four or more cess-pools and probably one hundred and seventy-five privies, mostly loose vaults, apparently in fair condition.

There is a ten inch pipe sewer in Main Street, about eight hundred feet long, to which about ten properties are connected and which empties into the tail-race of the grist mill a short distance below the mill on Mill Street. Across the creek at this street is the highway bridge.

The town stretches for a mile and a half along Main Street, which parallels Mahoning Creek and is distant therefrom two hundred to one thousand feet. This thoroughfare lies on a broad strip of flat ground back of which northerly the hills rise with steep grades. In the eastern part of this town there are two streets at right angles to Main Street on rising ground, where there are possibly thirty houses.

The tannery is located here on a little run and discharges its wastes into it and the sewages from the main office and grease house are conveyed by an eight inch pipe to the Mahoning Creek. The works have a capacity of two hundred and fifty hides, which are manufactured into sole leather, vitriol being used in the process. Tan bark and also tanning extracts are employed. The fleshings are rendered into tallow and grease, then barrelled and sold. No settling tanks have been provided on the property for the interception of sediment as required by law.

As would be expected, the run is polluted, but evidences of contamination were not discernible in the creek any great distance below the mouth of said run.

There is a large brick school building being erected on Main street in the central part of the town and the borough authorities find it necessary to build a public sewer to accommodate this school house. This is the present necessity for the sewer. However, the disposal of excrement into the ground in the vicinity of shallow wells in gravel renders the waters drawn therefrom for drinking purposes extremely suspicious. On the properties of G. W. Miller and Adam Miller, on Union avenue, there are cesspools distant about two hundred and fifty feet from wells supplying water to families in which some two years ago there were five cases of typhoid fever. Regardless of records, how-

ever, it is apparent that if a sewerage system were provided for the town and all buildings connected with it, there would be a diminution in the risk of an epidemic from water-borne diseases.

The borough purposes to lay a sewer in Main street, beginning near the tannery run and thence westerly the entire length of the highway to Big Run stream, a total length of one mile. At the outlet, the sewer is to be eighteen inches in diameter, continuing this size for two thousand eight hundred feet to two-tenths per cent. grade to a manhole at Mill street, from whence the size is reduced to fifteen inches, the grade increased to five-tenths per cent. and the pipe is to terminate in a manhole two thousand four hundred feet farther east. When necessary, the sewer can be extended to the extreme eastern limits of the town. Manholes are provided, but they are not put at changes in line. The depth of the sewer varies from four to eleven feet, the average being not over six feet. All of the land north of Main street, as the town grows, can be served by this main outfall and that part of it adjacent to the highway to the south.

Probably as much of the land as may be occupied in the future can be served by the proposed intercepter.

It is proposed to lay "Y" branches for house connections every twenty-five feet along the line of the sewer. It is also proposed to exclude all roof and storm water, but to drain cellars if necessary. So far as the department is informed, but few of the cellars are wet along Main street.

It appears that the outlet is to be laid at an elevation about level with the bottom of Big Run channel. The stream rises possibly four or five feet or more at the outlet and during such times the sewer would be backflooded for one-half its length. It would not be good practice to drain house cellars along this section of the sewer. Furthermore, it is not good sanitary practice to drain any house cellar into a sanitary sewer, because such open outlet in the cellar frequently emits sewer gas into the house, to the menace of the health of the occupants. A running trap for a house connection is objectionable. It promotes deposits, stoppages and sewer gas in the house. The best practice called for an untrapped house drain between the sanitary sewer in the street and the vertical soil pipe to above the roof of the house, with a clean-out hand-hole placed on the inside of the cellar wall.

In the operation and maintenance of a sewer system, out of experience, has grown the practice of locating inspection manholes at all changes in line and grades of the sewer and also at street intersections. The object sought is to secure a straight line of pipe so that an inspector can see through it between manholes, readily detect the location of any break or stoppage and easily manipulate applicances for the economical operation of the system. The plans submitted, therefore, should be modified in these respects.

The size of sewer proposed is larger than necessary, but since the borough has previously purchased or contracted for the pipe and it is now upon the ground, there is no harm in its use, provided ample flow be secured to maintain cleansing velocities.

The turning of the tannery waste into the sewer has been locally discussed and left an open question. It would not be satisfactory to admit these wastes untreated into the sewer system. There are two principal reasons. First, the suspended and fatty matters would deposit in the sewer and interfere with the sanitary operation thereof. This could be obviated by the installation of proper settling tanks and grease chambers on the tannery property to first receive and clarify the wastes, the effluent therefrom being discharged into the sewer only. Second, the volume of sewage would be many times that which would be discharged into the sewers through house connections therewith. So that if purification works be required, the cost of construction and operation would be increased many fold upon the public to the particular benefit of the private corporation. However, should the local authorities choose to assume this added expense as a matter of sound policy, then the tannery wastes might be admitted after preliminary treatment, as above described.

If manufacturing wastes from the tannery be excluded, some means must be at once devised to flush the proposed sewer.

At the outlet there is but one residence in the vicinity. The discharge of sewage here into a strong acid stream where there is a considerable volume and velocity of flow, followed farther down by reduced currents and opportunities for sedimentation, invites those natural processes of disinfection and purification which are known to occur in varying degrees when sewage is brought in contact with mine drainage under these conditions. However, it cannot be said that such sewage disposal will not menace the public health in Punxsutawney. The Mahoning Creek ought not to be used as a source of public supply unless the water be filtered, but the State is not warranted in sanctioning an increased pollution of the creek by sewage on this account.

The assessed valuation of Big Run borough is reported to be two hundred and nineteen thousand dollars. Recently the voters authorized a bond issue to the full constitutional limit of seven per cent. to pay for the school house. There were funds available, so it is said, sufficient to pay for the construction

of the proposed sewer. In any event, the municipality cannot assume the cost now of sewage disposal works. Either the sewage therefrom must be discharged, untreated, as proposed, or approval must be withheld and some other method of caring for the sewage of the school house provided.

It appears that the streams are acid and unsuited on this account for a source of water supply. The quality of the water is not otherwise adapted for domestic uses without treatment and clearly beyond the consideration of Big Run borough's sewage, the interests of the public health demand that Mahoning Creek at Punxsutawney should not be used as a source of public water supply.

Typhoid fever cases have been treated at Adrian Hospital, Punxsutawney, during the last two years. From August to November inclusive, of the year nineteen hundred and six, there were twenty-five such cases, and from March to May inclusive in the current year, sixteen cases, and in August, twenty-eight cases, all from the reports in the Department. The creek water was known to be supplied to the town during nineteen hundred and six, but such use of the water for the year nineteen hundred and seven has not yet been proven by the Department, although quite generally stated to be the fact.

The installation of filters for creek water, or the abandonment of the source by the substitution of some other supply, is a matter of many months' work and until these things be done no more sewage should be put into the stream above Punxsutawney, but, instead, there should be a diminution of such sewage disposal. Therefore, the Commissioner of Health cannot, in the interests of public health, determine that the Big Run sewer should be built and used at this time under the circumstances which render impossible the construction of a sewage purification plant at Big Run. If some way can be devised for the erection and operation of such a plant there, then the proposed sewer could be sanctioned, otherwise not.

It has been determined that the interests of the public health demand, in respect to the tannery sewage, that the tannery company be notified that it must cease to discharge sewage into the streams and the said company should be requested to submit plans for suitable receptacles for the refuse, or the water therefrom to the Department of Health for the consideration and approval.

With respect to the protection of the springs and wells in the borough, the local authorities should be warned they are hereby and herein warned against the risk now being run and the desirability of requiring the abandonment of cesspools and loose privy vaults, to be suggested and the substitution therefor of tight receptacles for the proper care and removal and disposal of the contents therefrom.

With respect to the proposed sewer it has been determined that a permit be withheld therefor and it is hereby and herein withheld and some other method of sewage disposal should be provided at the school house whereby surface and ground water shall not be contaminated.

In this connection it might be suggested that the cost of the sewer could be paid by assessments on abutting property and the available borrow funds together with an adequate contribution from the tanning company or other corporations could be obtained in a sum totalling an amount sufficient to pay for the erection of sewage purification works, that the Department would be glad to advise with the borough with respect with plans for such a plant and the erection of the same and the sewer.

With respect to the use of the Mahoning Creek by the Punxsutawney Water Company, it has been determined that such supply should be condemned and the company notified that it must filter the water or abandon the supply, and substitute some other source and that plans therefor should be submitted to the Department for consideration and approval not later than January first, one thousand nine hundred and eight.

And finally with respect to the pollutions on the water-shed of the Lindsey Water Company, the said water company will be notified that it is required to furnish a pure and wholesome water, and that, while the State Department of Health will assist, if need be, in the abatement of all nuisances and menaces on said water-shed, the power vested in the Commissioner to do these things does not relieve the water company from the responsibility of supplying a pure water, and that, therefor, said company must do all those things necessary and customary in good practice to prevent contamination of its source of supply. Among other things, a sanitary patrol should be established by the water company and monthly reports thereof submitted to the State Department of Health.

All of which is of peculiar importance to the inhabitants of Big Run borough and is herein called to the attention of the local authorities.

Harrisburg, Pa., November 2nd, 1907.

BLAIRSVILLE, INDIANA COUNTY.

This application was made by the borough of Blairsville, Indiana county and is for permission to extend a part of its public sewer system and to discharge

therefrom into Sulphur Run, and also for permission to extend sewers at random in the borough.

It appears that the borough of Blairsville is a municipality of about three thousand five hundred people, located in the extreme southern central part of Indiana county on an elevated plateau at the base of which is the Conemaugh river. The stream flows generally northwesterly and forms the southerly boundary of Indiana county and the northern boundary of Westmoreland county. Where Blairsville is located the river flows southerly for over a mile and then turning sharply flows nearly northerly for a mile or more, and in this bend the town is built. So the river forms the easterly and westerly boundary of the borough but not the southerly because there is a tract of land at the end of the neck which is not included in the municipality. It is here that the extensive plate glass plant which employs several hundred hands is located. The community is essentially a railroad town. The Pennsylvania Railroad has shops and yards and division officer's headquarters.

In the northern part of the borough there is a deep narrow ravine in which flows a stream known as Sulphur Run. It rises to the northwest, at a village in Burrell township known as Smith Station, and in its small water shed there are two new coal operations and four old ones from which sulphur waters are continually draining by gravity into the run. The stream is highly colored, its stony bed is covered with deposits of a yellowish color and it is known to be highly acid in quality.

The borough has an incomplete system of combined sewers, owns its own water works and has permanently paved many of its streets. To the last fact may be attributed the adoption of the combined system of drainage.

The Conemaugh river above the borough is the source of water supply. The water is taken through a sixteen inch suction pipe having a strainer on its end submerged twelve inches below extreme low water in the river and raised by means of pumping engines, one of two million gallons capacity, one of seven hundred and fifty thousand gallons capacity and one of five hundred thousand gallons capacity, through three force mains, sixteen, eight and six inches in diameter respectively, each four hundred and twenty-five feet in length, to a masonry reservoir located on the hill two hundred and six feet above the river and being sixty feet in diameter and eight feet deep. The capacity of this reservoir is one hundred and sixty-nine thousand gallons. Water is supplied from it through a sixteen inch gravity main to the town. Its length is less than one-half mile.

The principal part of the borough varies from fifty to seventy-five feet above the river so that the static pressure from the reservoir may be said to average one hundred and thirty feet. Of the eight miles of water mains in the system one-half are four inches in diameter. Practically every street in the borough has a water pipe laid in it. Out of a total population of three thousand four hundred and one in the district there are three thousand and thirty-eight actual consumers. It is reported that about three hundred citizens rely on private wells or springs only, and that three hundred more use partly such sources and partly the public supply.

All water passes through the storage reservoir whose capacity is less than the daily consumption, and since there is no attempt at purification, any pollution existing in the Conemaugh river might pass directly into the street main. At times the water drawn from the taps in the town is turbid corresponding with the times when the river water is turbid. The city of Johnstown is located on the same river about twenty miles above Blairsville and the sewage from this place and others is discharged into the river. There were reported for the year one thousand nine hundred and six, nine cases of typhoid fever and none for the first four months of the current year. Notwithstanding this record the supply is not safe and the citizens should be warned of the fact.

The eastern part of the borough abutting the river is drained by the Morewood avenue outlet sewer. This pipe is ten inches in diameter and serves all of the territory which drains to the river on this side of the town. The system comprises four thousand feet of pipe, all ten inches in diameter.

The main sewer district includes the principal part of the borough territory lying west of the Pennsylvania Railroad to the river. The outlet is a brick structure three by five feet in diameter, extending from the railroad westerly for most of its length in South Alley and emptying over the cliff into the river opposite the end of Brown street. This point is one block up stream above the Market street highway bridge over the river. The system comprises ten thousand four hundred feet, of which two thousand eight hundred and fifty feet are in the main sewer above described which was substituted for a natural water course now abandoned, (formerly named Bloody Run), six thousand eight hundred feet are either twelve or fifteen inch pipe and the balance ten inches or smaller.

At the foot of Market street there are two small sewers, one six inches and the other twelve inches in diameter, emptying into the river, each being about eight hundred feet in length.

Below the Market street bridge, at the foot of Campbell street and again at the foot of North Alley there is a private sewer emptying into the river, the former being six inches in diameter and five hundred feet long, and the latter eight inches in diameter and thirteen hundred feet long.

Sulphur Run joins the river just below North Alley. It receives the discharge of three private sewers and two public sewers.

The first is a six inch private sewer, drains the Blairsville Female College buildings and empties into the run at the foot of Spring street, length of sewer eight hundred feet.

The next outlet into the run is at Walnut street. The Pennsylvania Railroad Company is eliminating crossings at grade of its low freight lines and highways in the borough, by carrying the tracks beneath the highways in an open excavation. This cut interfering with some of the borough's sewers has resulted in the construction of a thirty-six inch brick sewer, which intercepts the Market street sewer and others to the east of the railroad track and conveys the sewage and storm water to the run at Walnut street. At this point for a distance of several hundred feet the run has been closed in a ten foot arched culvert. This system comprises six thousand seven hundred and twenty feet, of which two thousand three hundred and twenty are thirty-six inch sewer, one thousand eight hundred and fifty feet of eighteen inch and twenty inch, about the same amount of twelve inch, and the remainder less than twelve inches in diameter.

The next outlet into the run is a private sewer, ten inches in diameter, three hundred feet long in East Lane.

The Connor alley sewer outlet into the run is ten inches in diameter. It serves a district in the borough east of the railroad comprising two thousand five hundred and seventy-five feet, of which six hundred and fifty feet are eighteen inches, eight hundred feet are fifteen inches, six hundred feet are twelve inches, and the smallest six inches in diameter. The outlet is made smaller because of being carried down the slope of the ravine to the run on a steep grade.

The other sewer outlet is ten inches in diameter and belongs to private individuals. It is said to be the only sewer in the borough north of Sulphur Run. The sewer is seven hundred feet long and is into the run above the Connor alley outlet.

The drainage from the plate glass company's plant is into the river. There seems to be no reason why this territory should not some day be annexed to Blairsville.

Of nine hundred and one buildings in the town, four hundred and one are reported to be connected with the sewers. There are also four hundred and seventy-seven privies in the borough, some of which have sewer connection. It is estimated that less than half of the population live in dwellings which have sewer connections. There is a total length of five and a half miles of sewers and about eight miles of water pipe. More than five-eighths of the built up section of the town is reached by sewers. In this district, as well as outside of it, more or less sink water reaches the street gutters.

Permanent street improvements are contemplated in Brady street, and the borough wishes to lay down a sewer there and connect it with the sewer in Campbell street, which is a part of the Walnut street outlet system. The proposed sewer will comprise four hundred and sixty-seven feet of twelve inch and six hundred feet of ten inch pipe.

The borough also purposes to build four hundred and eighty-five feet of ten inch pipe in Harvey alley and connect it to the Maple avenue sewer which is a part of the Connor alley sewer. The borough wishes to be permitted to make other extensions to its system from time to time as the necessities of public health or street paving demands.

Undoubtedly the very acid waters of Sulphur Run deodorize and disinfect to a pronounced degree the sewage now discharged into it. In this fact and also in the fact that the run is in a ravine and hence secluded may be found the reasons why this sewer outlets have not caused a local nuisance.

The Conemaugh river, however, cannot be a highly acid stream above the town, else its waters would be unsuitable for town uses. Large quantities of mine drainage are daily emptied into the river and its tributaries and judging from statistics the pollutions of the river have become generally dissipated by the time Blairsville water works intake has been reached. It is not safe, however, to rely upon the natural agencies and hence Blairsville should establish works for the purification of its water supply which may be so regulated and controlled as to safeguard the public under all circumstances. Meantime, it is clearly the duty of the State Department of Health to forewarn the local authorities of the lack of security afforded by the present system and to request that the public be notified to boil all water used for domestic purposes.

Sixteen miles below Blairsville the borough of Saltsburg takes its water supply from the river. Forty-one miles below Blairsville the borough of Freeport takes it water supply from the Allegheny river and seven miles farther down stream the river is used as a source of supply by Tarentum. Sixty-one

miles below Blairsville the city of Pittsburg and adjoining municipalities draw their drinking water from the river.

It is probable that the Conemaugh river and its tributaries will become more acid in the near future. Many new coal mining operations are being started in that part of Indiana county drained by Black Lick creek, which empties into the river about two miles below Blairsville. Blairsville is reported to have a total valuation of about nine hundred thousand dollars, and a bonded indebtedness of forty-five thousand. If this is true its borrowing capacity is in the neighborhood of eighteen thousand dollars, which is entirely insufficient to defray the cost of treating the town sewage before it is discharged into the river. It is a sufficient amount however to pay for the installation of an adequate water purification plant and the interests of the public health would indicate that this latter public improvement should be undertaken. The proposed sewers especially the Harvey alley sewer, are needed. Undoubtedly the acidity of the Conemaugh river and its tributaries materially diminishes the danger to Saltsburg's water supply by reason of the discharge of sewage into the river at Blairsville and other places. Because the proposed sewers will empty into a small and very acid stream whose flow is largely drainage from coal mines which never ceases, it would appear just that the State should sanction the sewer extensions. However, it is possible that the acid waters of Sulphur Run may be utilized and controlled as to be a permanently effectual means of treating the sewage in the districts of the borough tributary to it and the State may be able later to offer valuable advice in the solution of the problem.

The extension of the sewers in the districts tributary to the river, however, involves the question of local necessity versus general public health. While petty extensions may not measurably increase the pollution of the river and hence the water supply at Saltsburg and other places, yet the principle as a lasting one is contrary to the State policy of preserving the purity of streams. For a town of its size Blairsville is very well sewered. It is limited in capital and will not for years be able to undertake any large expenditure, such as the rebuilding of its sewer system would involve. Hence any plan for the interception of ordinary house sewage would necessarily include overflows from the combined sewers to the river in times of excessive precipitation. Such a project would be a very great safeguard as it would reduce the periods of danger to a small fraction of the year and then for short periods only.

It has been determined that the interests of the public health demand that the borough authorities should be notified that its present source of water supply is prejudicial to public health and that the public health should be safe guarded by the installation of an approved water purification plant and that meantime, the public should be warned that all water used for drinking and culinary purposes should be boiled.

It has also been determined that a permit be granted and permission is hereby and herein granted for the extension of the proposed sewers of the Connor alley and Walnut street outlet systems; and that general permission be denied to extend sewers at random in the borough for the present, under the following conditions and stipulations:

FIRST: That on the right to discharge sewage ito Sulphur Run shall cease on the first day of May one thousand nine hundred and nine, but if on that date the interests of the public health demand it, the Commissioner of Health will give an extension of the time.

SECOND: On or before the first day of May one thousand nine hundred and nine, the borough shall prepare a plan or plans which shall have for its ultimate object the discontinuance of the discharge of any sewage from the borough of Blairsville into any of the waters of the State, unless such sewage shall have first been satisfactorily treated in works built for the purpose, which plans shall be submitted to the State Department of Health for approval.

THIRD: No pathological material from any laboratory shall be discharged into the sewer system; the proper authorities shall cause these wastes to be incinerated on the premises.

FOURTH: If for any reason the sewer system, or any part thereof, becomes injurious to the public health, then such remedial measures shall be adopted as the Department of Health may suggest or approve.

Harrisburg, Pa., June 10th, 1907.

BRISTOL, BUCKS COUNTY.

This application was made by the borough of Bristol, Bucks county, and is for approval of plans and permission to construct a system of sewerage and sewage disposal works, and to discharge the effluent therefrom into the Delaware river, within the limits of Bristol township.

It appears that on June fifteenth, one thousand nine hundred and six, a complaint was duly made to the State Department of Health by residents and taxpayers of the borough calling attention to the insanitary conditions of the surface drainage in many parts of the town, and the contamination of water in the wells on many properties, and asking for an inspection and prompt remedy.

On June twenty-second, one thousand nine hundred and six, the Bristol Water Company entered a formal complaint with the Commissioner of Health relative to the contamination of the source of water supply of the borough and requested that prompt measures to abate the menaces be taken.

With respect to the pollution of wells, on investigation it was ascertained that there were about one thousand six hundred and fifty dwellings in Bristol of which eight hundred or thereabouts were supplied with water by the Bristol Water Company, and that the remaining dwellings relied upon dug or drilled wells on individual premises, many of which wells were in close proximity to cesspools and privies.

The present population in the municipality is in the neighborhood of eight thousand. It was estimated that not over one-third of this number are served by sewers. The fifty odd cesspools receiving both sewage and wash water were reported as requiring occasional emptying because the sewage did not percolate away into the ground fast enough. Now, as well as at the time of the inspection, dry privy vaults are very numerous and in many of the dwellings, not provided with a sewer, slops and wash water are drained by facilities which terminate in street gutters in those instances where the discharge cannot readily be effected into a natural water course. The borough site is unusually level, of porous gravel formation, the grades of the streets and yards have but a slight inclination, and consequently, household drainage thrown out on the surface percolates into the ground more readily than if the inclination were steep. Therefore, organic pollution of the soil is liable to remain in the vicinity where deposited. Under these circumstances, there is danger in drinking water drawn from the ground, especially from shallow wells in proximity to privies and cesspools. At the time of the inspection it was ascertained that the students of the high and common school (the school buildings being located on the same lot) were in the habit of drinking water taken from a well whose location is within a few feet of the cesspool receiving the sewage of the two institutions, and also within a few feet of an old well on the grounds of the Pythian Hall building, from which building the sewage was being discharged into the old well. Immediately back of and less than one hundred feet distant from the school well, there is a cemetery. Under these conditions the health of those drinking the said well water would be constantly menaced.

It was concluded that the complaint against the use of well water in the town was well founded, and that all such water should be boiled before being used for drinking or culinary purposes.

With respect to the water company's complaint, it appeared upon investigation that there were public and private sewers, privies and industrial plants, from which polluting material was discharged into the Delaware river in the immediate vicinity of the water works intake, or into tributaries of the river under conditions which menaced the said supply. It also appeared that throughout the borough, wherever possible, either sewage was conducted to the nearest water course or privies were placed on the banks overhanging the streams, and that wash water and slops were emptied into the water courses. The inferior quality of the water furnished by the water company may have been one reason for the preference on the part of many of the towns people for the ground water.

For years the Bristol Water Company had furnished to its consumers crude Delaware river water polluted by sewage and industrial wastes of the borough and of other municipalities above Bristol in the Delaware river valley. The citizens knew of this pollution and in consequence were deterred from liberally patronizing said water company. Hence the use of ground water taken from the wells on individuals premises was promoted.

The process of purifying water by mechanical filtration has been perfected so that water like that of the Delaware river may be treated and rendered safe for domestic uses. With the approval and by the advice of the State Department of Health, the Bristol Water Company installs such a plant during the summer of one thousand nine hundred and six. Because such a safeguard does not afford absolute assurance, especially where the source is subject to gross sewage pollution, the interests of the public health demand as pure a source of supply as can be obtained, and it was concluded that the water company's complaint was well taken.

The borough of Bristol is located on the north bank of the Delaware river fourteen miles below Trenton and about eight miles above the intake of the Torresdale filter plant of the city of Philadelphia's water works system. The tides extend back as far as Trenton. At Bristol the rise and fall is between five and six feet. The ebb tide has an average period of seven hours duration, and the flood tide five hours. A float thrown into the river will go up stream on the ebb tide several miles, so it is said. It is evident that with an average velocity of two and one-half miles per hour on the flood and three miles per hour on the ebb, that sewage emptied into the Delaware river anywhere in the vicinity of Bristol would be very liable to pass and repass the water works intake which is located in the central part of the borough at the foot of Walnut street at a point where strong current exist in the river.

The borough is bounded on the east by Adams Hollow creek, on the north by Mill Pond, Adams Hollow creek and Otter creek, and on the west by Otter creek and the basin. Midway through the town, east and west, is the old Delaware Lehigh canal still in use. It terminates in a basin which has a lock outlet into the river. Thus the borough is surrounded by natural water courses. The main line of the Pennsylvania Railroad passes through the town paralleling the canal. The industries are located between the railroad and the canal, or on the banks of the canal. The resident section and business center is between the railroad and the river. Along the river front about every dwelling or building sewers into the river. The business highway is named Mill street, and the buildings and dwellings on it and adjacent streets are sewered into the basin.

The buildings in the vicinity of Adams Hollow creek are generally sewered into it. The industrial plants between the canal and the railroad discharge their wastes and sewage into a natural water course which is partly covered up in a box drain four feet wide and eighteen inches deep, and partly open and located in Canal street. The lower part of this natural water course, from Canal street to Beaver street, and across Beaver street partly through private land has been improved by the substitution of a twenty-four inch pipe in place of the open ditch. The flow of this stream is conducted under the canal and finally reaches the marshes and Otter creek. Into this natural water course the liquid wastes and sewage from the worsted mills of W. S. Grundy and Company are discharged. Wool in the fleece is taken and scoured here and settling basins are provided to intercept the solid portion and to permit the liquid to overflow into the stream. The sewage wastes from the Bristol Iron and Steel Company's plant, from the Edward T. Steel Company's worsted mill, Pierce and Williams saw mill, T. V. Karkin's foundry, Kayser and Allman wall paper mill, and from the Thomas L. Leedlam and Company carpet mill are also discharged into this natural water course. The uncovered portion of it is an open sewer. At the time of the investigation stranded particles of organic matter were to be seen along the sides thereof; the liquid had a dark color, had stained the sides and besides being disagreeable in appearance emitted strong putrefactive odors. At that time the stream was sluggish in flow and altogether a nuisance and such as ought not to be tolerated as soon as a general sewerage system and means for purifying the sewage shall have been afforded.

The William Henderson carpet mills sewage goes into the canal.

The Corona Kid Manufacturing Company employs about nine hundred hands. The sewage from this plant which is in the northeastern corner of the town, goes into Adams Hollow creek. At this manufactury hides which have been tanned are received and enameled. The process requires the extraction of all oils in the leather. The residue from the extraction process is discharged into the creek. There is a tank about twenty feet square which is said to be partially emptied twice weekly. In the Third ward, which is in the district north of the canal in the western part of the borough near Otter creek, there are no public sewers or private sewers except those from houses located on the banks of the creek or the mill race. Elsewhere in the district there are privy vaults and the slops and wash water go into the street gutters.

On June twenty-eighth, one thousand nine hundred and six, the Commissioner of Health determined it to be for the general interests of the public health, that all individuals, private corporations and companies and the municipality discharging sewage, or any of the waste products or excrementitious discharges from the bodies of human beings or animals, into any stream, spring, or body of surface or ground water in the borough of Bristol or adjacent thereto within the boundaries of the State, shall discontinue such discharge and a written notice was given to this effect to every such individual, corporation or company known to be discharging sewage into the streams within the borough limits. Further, the notice stated that some more sanitary way of disposing of the sewage must be devised whereby the sewage may be treated satisfactorily before it goes into the river. A public election has since been held and a bond issue authorized for the construction of a general sewerage system.

The borough purposes to install a strictly sanitary sewer system for the entire municipal limits and to collect the sewage by gravity in a pump well to be located on the marshes near the banks of the Delaware River below the borough in Bristol Township, from whence the sewage is to be lifted into sewage disposal works to be erected at the same place.

All storm water is to be excluded from the system, the sewers are to range in size from eight to twenty-four inches in diameter and comprise all told thirteen and six-tenths miles.

Two automatic flush tanks are provided in the system, the sewers being proportioned for self-cleansing with the intention that hand flushing shall be accomplished at manholes when necessary. Manholes are to be located at all dead ends, summits, intersections and changes of line and grade. All sewer lines are to be absolutely straight between manholes. Iron covers at said manholes are to be perforated for ventilation. The specifications

require the use of vitrified pipe and the construction of tight cement joints. The sewers are not to be under-drained.

Because of the topography, minimum grades are provided for the sewers. For instance, quite a number of the eight inch sewers will have grades of three-tenths per cent. At such grades, unless the flow in the sewer be very considerable, there will be accumulations of deposits which will require to be forcibly removed. All of the sewers in the district north of the canal are to form a part of a system to be served by a twenty inch main which is to pass under the canal and the railroad near Mill Street to a drop manhole at the head of the canal basin. Into this drop manhole an eighteen inch sewer main is also to discharge which main is to serve all the districts of the borough south of the canal. From the said drop, the outfall sewer to the pump well is to be twenty-four inches in diameter and one thousand three hundred and fifty feet long. The specifications provide that iron pipes shall be used where a sewer runs under or through water ways or under a railroad or wherever it is deemed necessary by the engineer. The joints of all iron pipes are to be of lead properly caulked. If this form of construction be rigidly adhered to, the outfall sewer and the twenty inch main as far as Mill Street and the eighteen inch main as far as the foot of Pond Street, will be of iron.

It is in the low part of the borough about the water-ways that ground water will be encountered in the sewer trenches more than is likely to be encountered elsewhere. It is estimated that one eighth of the entire length of the sewer system will be in territory where the ground water will be permanently higher than the sewer. So in this district special care must be adopted to render the sewers tight, else the leakage into them easily amount to several times more daily than the volume of house sewage to be discharged into the system.

The borough purposes to build at once slightly less than ten miles of the sewer system. A ten inch line will be laid in Beaver Dam Road to the summit near the Corona Kid Works, a ten inch will be laid up Canal Street by all of the industrial plants hereinbefore enumerated, and in fact the occupied portions of the town will, under the proposed system, be immediately afforded sewerage facilities. The local authorities with commendable zeal have made an earnest effort to afford a practical remedy suggested by the Commissioner of Health in the notification of June twenty-eighth, one thousand nine hundred and six.

The borough also proposes to build at once sewage disposal works comprising a pumping plant, septic tanks, contact beds and sand filters. Its full capacity is designated to be six hundred thousand gallons daily. The locality selected seems to be the only available site. Nowhere in the borough is there land for the purpose but on the marshes west of Otter Creek there is a tract of land a little higher than the marsh dyked off by the proprietor to prevent flooding of his crops. Here in the corner near the river and the creek, at a point about one thousand six hundred feet radius from Mill Street and the railroad and the farmer's residence in the township, it is proposed to erect a plant.

The elevation of the mean high water of the river is one hundred and three, local datum, corresponding to three feet above the Sandy Hook base. The highest freshet recorded attained an elevation of one hundred and ten and two-tenths feet. The top of the dyke is at an elevation of one hundred and eight and one-half so that should an extraordinary freshet again occur, the land within the dyke would be flooded.

The pump well is to be built of masonry and to be ten feet in diameter and five feet to the bottom below the flow line. This flow line will be at the level of the invert of the twenty-four inch outfall sewer whose elevation is to be ninety-four and sixty-six hundredths or eight feet below mean high water. However, said flow line will fluctuate and may be permitted to rise in the well to about elevation one hundred and three before any street main in the new sewer system of the town would be seriously backflooded thereby. The top of the pump well is to be carried up above the freshet flow line and the pumping machinery is also to be protected.

In the pump house the machinery and piping is to be in duplicate. There are to be two fifteen horse power gas engines and two centrifugal pumps and two suction and force main pipes so arranged that pumping operations may be continuous, admitting of repairs to the duplicate parts or apparatus not in use at the time. The capacity of each single unit will be ample for any demands to be put upon it. The rate of pumpage will be adjusted to the rate of flow of sewage from the town. No overflow pipe to the stream from the well is to be provided.

Sewage from the pumps after being screened at the well is to be delivered to the open septic tanks whose flow line is to be elevation one hundred and twelve whose walls are to be carried up to elevation one hundred and thirteen and to be built of concrete. In fact, all of the tanks, beds and filters are to be placed in structures having concrete bottoms and sides and to be built water tight and open at the top with one exception, namely, that the drying

area for sludge drainage is to be composed of sand two feet deep resting on natural earth formation. This area is to be fifty feet long and twenty-five feet wide and to be drained by a fifteen inch pipe to the river.

The septic tanks are four in number arranged side by side, each sixty feet long, nineteen feet wide and six feet deep from the flow line. The sewage is to be delivered into each tank just below the surface by means of two openings through the end wall along which there is a distributing trough from which, at will, by opening the sluices, sewage may be admitted to any one or all of the septic tanks. Extending across the inlet end of each tank and three feet therefrom is to be baffle board suspended from the surface to mid-depth of the sewage, which is to serve as an equalizer of the currents. The outlet from the tanks is a six foot weir in the wall at the centre over which the sewage is to flow from the end opposite to the inlet of each tank into a collecting trough extending across the entire length of the ends of the four septic tanks by means of which sewage from any one or all of the tanks may be collected and conducted either to the settling basins or directly to the contact beds. Underneath this trough and between the walls supporting it is an open space designated to serve for the drainage of the septic tanks or the settling basins, and connecting with an eighteen inch pipe to the sludge drying area.

On the opposite side of this conduit from the septic tanks are the two settling basins, each thirty-one and a half feet long by twenty-two feet wide and six feet deep, divided by a wall containing a trough at the top, extending to the filter beds. By means of sluice gates which may be inserted in the trough, the septic tank effluent may be directed to either one of the settling basins, entering them and leaving by means of weirs so placed that by a division wall to be built across each basin nearly its whole length, the liquid must pass longitudinally a distance of at least sixty-three feet in its course through the basin.

The contact beds are four in number, each one hundred feet long by fifty feet wide and to be filled with three feet of filtering material, crushed rock, the lower layer being twelve inches thick of two to three inch stone, the intermediate layer twenty-one inches thick of one to two inch stone and the top layer three inches thick of one-quarter to one-half inch stone, all resting on semicircular six inch tile underdrains, spaced two feet on centers. By means of partition walls, each filter is divided into equal compartments fifty feet square and so arranged that but one compartment in each filter need be used if necessary.

In the center about which are grouped the four contact beds, there are located the controlling chambers and house for the installation of the Merritt Automatic Airlock sluice ways for the purpose of automatically distributing and collecting the sewage in its passage through the plant from the septic tanks or settling basins to the sand filters.

This apparatus will distribute the sewage into the surface of a fifty foot compartment and when the bed is filled three feet deep to elevation one hundred and ten and a half, automatically shut off this bed and turn the sewage into the next fifty foot compartment adjacent to the house, and so on, completing the cycle of the four compartments grouped around the controlling chambers. The intention of the designer is that these four smaller beds shall be dosed twice daily. When the flow of sewage exceeds the volume (three hundred thousand gallons daily) required to fill these four fifty foot contact beds twice daily, then the intention is to bring into commission the outside series of contact bed compartments. The second compartment of any contact bed is to be dosed on the fill and draw plan, the underdrains serving as distributors and collectors. Through the partition wall at the bottom there are to be two pipes fitted with gates connecting the underdrain system of the first compartment with that of the second compartment, so that on the opening of the gates sewage will rise to an equal height in both beds. When both compartments of all four beds are in use the plant will be operated at the maximum capacity designed, or six hundred thousand gallons per twenty-four hours, equivalent to a rate of filtration in the contact beds of one million two hundred thousand gallons per acre daily, or thereabouts.

Each one of the four contact beds is to be connected with its corresponding sand filter. So there will be four sand filters, each fifty feet square, having three and one-half feet depth of sand the surface of which is to be elevation one hundred and seven and the top of the enclosing walls elevation one hundred and eight. The said is to rest on a concrete floor, also the tile underdrains, they being six inch semi-circular, spaced four feet on centers and extending across the entire width of the filter, each line passing through the wall at the bottom into a concrete collecting trough the bottom of which is to be at an elevation of one hundred and three, which is mean high water mark. The sand filters are placed side by side, adjacent to the contact beds and between the contact beds and the dyke paralleling the river. The effluent from the sand beds will be conducted by means of an eighteen inch terra

cotta pipe to the river. The plans do not show it in detail and no mention is made of a valve on this or the fifteen inch pipe to the river from the sludge filter.

In the centre of each sand filter there is to be a circular ring, inside diameter three feet, outside diameter eight feet, built of concrete, in which the effluent from the contact beds is to be delivered and thence distributed over the surface of the sand, the ring being placed at or slightly below the filter surface. The rate of filtration when operated at the full capacity of the plant will be two million four hundred thousand gallons per acre each twenty-four hours. Bacteriological purification is not anticipated by this finishing process in the treatment of the sewage by the entire filter plant. The sand filters will act more as rapid strainers and will probably fill up rapidly and require constant attention. The usefulness of the sand filters will depend largely upon the intelligence and skill with which the entire plant is operated. Whenever the river rises above the mean high water mark, the sand filters will be put out of commission and in the event of a flood carrying large quantities of sediment the backflooding of the underdrainage system by silty water might seriously damage the filter and put the town to considerable expense for a remedy.

Flood gates should be placed on all drains or openings through the dyke into the creek or river and an arrangement should be made so that the output from the plant could be pumped into the stream at times when a gravity discharge is impossible.

It is anticipated that the sewers will be generally availed of and that on completion of the system the daily flow of the sewage will be in the neighborhood of six hundred thousand gallons. No account has been made in the design of the disposal works for the immediate addition to the sewer system of the industrial wastes. What the total volume of such waste is, is unknown to the borough expert and to the State Department of Health. Undoubtedly some of these wastes may be unsuitable without preliminary treatment at the plant for admission to the sewers. It is the customary policy in Pennsylvania for municipalities to provide outlets for industrial pollutions so far as such pollutions may be handled in the public sewer system. The borough of Bristol should thoughtfully consider what changes if any may be necessary in the proposed sewer system and disposal works to provide for the handling of such portions of the liquid wastes from the industrial plants as it is desirable to take into the sewer system. It might be best policy for the Corona Kid Company to pump its sewage and other wastes over the summit into the borough sewer than to attempt a change in disposal in any other way. Investigations might show that for the industrial uses alterations in the proposed sewer plans should be made. Also that in event of the collection of both domestic and manufacturing sewage that the proposed sewage disposal plant would be inadequate in capacity to successfully treat the sewage. In such a case extensions and changes in the plant would be required at an earlier date than otherwise, but every installation of this character is tentative in its design. The proposed plans are so arranged that more units may be added as desired. At best the disposal works will not attain the highest standard of bacteriological efficiency. A clear, odorless and non-putrescible effluent, however, should be produced. The matter of enlarging the plant to meet requirements is a question of fact to be settled at the time the first installation becomes outgrown. The present plans make a reasonable provision for growth so far as domestic sewage of the town is involved. If house connections with the sewers are not general and rapid, then the plant proposed may prove adequate for the treatment of both domestic and manufacturing sewage and possibly so anyway.

There can be no question about the necessity for a sewer system to take both kinds of waste and there can be no question about the necessity for a very careful high class maintenance of the proposed disposal works. The site is too near the town to permit lax methods to obtain. A failure at the plant would constitute a nuisance easily manifest a greater distance than that between Mill street and the septic tanks. The interests centered in the use of the river water above and below the proposed outlet for the sewage effluent demand that the proposed sewage disposal plant shall be efficiently operated.

It has been determined that the interests of the public health demand that approval be given and approval is hereby and herein given to the plans and permission granted for the construction of the proposed sewerage system and sewage disposal works under the following conditions and stipulations:

FIRST: That all storm and roof water shall be excluded from the system and that no existing public or private sewers shall be connected or permitted to connect with the proposed sewer system if found to be in a leaky condition or a conduit for roof, street, cellar or other water except sewage proper, and not then unless approval be given in writing by the borough's expert in charge of the design and construction of the sewerage system. And, further, that at the close of each season's work, the borough shall prepare a plan and

profile of the sewers laid during the year and file the same, together with such other information as may be required, with the State Commissioner of Health.

SECOND: The local authorities shall make or cause to be made at least once monthly, an inspection of the sewers at every manhole, and a flushing by hand or otherwise, and removal of stoppages on all lines requiring it, and a record shall be kept thereof and a copy submitted to the State Department of Health whenever such a copy may be called for.

THIRD: The borough shall construct the outfall sewer and the twenty inch main as far as Mill Street and the eighteen inch main to the foot of Pond Street of Cast-iron with lead joints, extra care shall be taken at the manholes and at the pump well to render these structures water tight and because a water tight sewer system is almost vital to the success of the entire improvement, it is stipulated that the entire works shall be constructed under the direction and supervision of the experts who have planned the works or by others equally competent to execute the design.

FOURTH: For the purpose of requiring all estates now sewering into any stream or body of water to discontinue such discharge and to connect with the public sewer, the borough shall provide an ordinance therefor and put it into execution as soon as the sewerage system herein approved is ready for use.

FIFTH: The borough shall reconsider the question of admission of trade wastes to the sewer system, determine through its experts the quantity and quality of the wastes from each particular plant and what rules and regulations may be necessary for the municipality to enforce regarding the admission of such wastes to the sewer system, to the end that pollutions of the streams shall cease, and a report thereof submitted to the State Department of Health for advice and approval, which report shall be filed in time to permit of any necessary modifications in work proposed to be done this year.

SIXTH: The walls at the pump well shall be carried up to above the highest flood level ever recorded. Flood gates shall be placed on all drains and outlets from the plant to the river or creek, the drain from the sludge sand filter shall discharge into the pump well instead of the river as now planned and arrangements shall be made whereby the filtrate, when prevented by high water in the river from passing by gravity into the stream, may be pumped over the dyke to its proper destination.

SEVENTH: The borough is advised to secure at least five acres of ground at the disposal works and to arrange for the reconstruction of dykes about the plant to an elevation higher than that of any recorded flood, unless the borough should submit sufficient reasons why protective enbankments should not be provided.

EIGHTH: The controlling apparatus is, according to the design, a very important part of the disposal works. Because any mechanism may suffer accident or fail at time to work, provisions shall be made whereby the passage of sewage through the various filter beds may be controlled by hand conveniently in the event of accident or repairs to the automatic mechanism and because the plant is to be continuously operated, the borough shall employ constant attendants of a class capable of understanding the principles of sewage purification and responsibilities involved in assuming the duties of care and operation of such a plant.

NINTH: Such reports of the operation of the disposal works shall be made to the Department of Health on blank forms to be furnished by the State, as the Commissioner may require, and if at any time, in the opinion of the Commissioner of Health, the system of sewerage and sewage disposal works, or any part thereof, is inadequate for or prejudicial to the public health, then such remedial measures shall be adopted as the Department of Health may approve or advise.

TENTH: No pathological material from any laboratory shall be permitted to discharge into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

The borough is advised to cause an abandonment of dug and drilled wells in the borough, or in cases where wells are continued in use, to require the boiling of the water consumed for domestic purposes. Special attention is also called to the need of high class work at the disposal works and also in the construction of the sewer system. The economy of keeping the sewers tight by proper construction which involves ample inspection of each joint in the sewer line is emphasized.

Harrisburg, Pa., June 26th, 1907.

BUTLER, BUTLER COUNTY.

This application was made by the borough of Butler, Butler County and is for permission to extend its sewer system and to discharge the sewage therefrom untreated into Conoquenessing Creek, within the said borough.

The borough of Butler is a thriving industrial community of over twenty thousand population, having more than doubled its size since nineteen hundred when the census returns showed a population of ten thousand eight hundred and fifty. This boom is attributable to new industries which have located in the town. Besides being the county seat it is also in the center of a farming region and also in the natural gas and oil fields. The borough is located in the central part of the county on the Conoquenessing Creek and on the main line of the Baltimore & Ohio and main line of the Buffalo, Rochester and Pittsburgh, the Bessemer and Lake Erie Railroads and the West Penn Branch of the Pennsylvania Railroad System. Its transportation facilities and natural resources indicate continued prosperity and growth.

The town's water supply is furnished principally by the Butler Water Company. It is said that possibly three hundred families use water taken from shallow dug or drilled wells scattered over the borough. About one hundred and fifty families in ward one are supplied with ground water by a mutual association. So far as the Department is informed the rest of the community gets its supply from the said water company whose sources are surface waters taken from three places on the watershed of the Conoquenessing Creek above Butler. One is from the Boydstown reservoir, seven miles above the town near the head waters of the creek; another is Thorns Run reservoir located on Thorns Run, a tributary of the creek, the reservoir being about two and a half miles above the town, and the third is Conoquenessing Creek itself. The watershed above the pump house and filter plant just outside of the borough where the main stream enters the town, comprises forty-four square miles of sparsely populated broken, hilly country of which fourteen square miles are above the Boydstown dam and six and five-tenths square miles are above the Thorn Run dam. The water from each is piped by gravity to the suction well at the pump house. If for any reason it becomes necessary to resort to the creek at the pump house, this is done by means of facilities permanently provided for this purpose. The water is subjected to mechanical filtration before being supplied to the town. During the memorable winter of nineteen hundred and three and four, during temporary repairs to the filters, the raw creek water was pumped directly to the system and supplied to the consumers. It happened that there were cases of typhoid fever on the watershed at that time and through careless disposal of the excreta from the patients the surface waters were infected and the infection transmitted to the town resulting in an epidemic totalling thirteen hundred and eighty-four cases and one hundred and eleven deaths.

At that time there was a comprehensive sewerage system in Butler in extensive use, the natural drainage and general sanitary conditions were good and the people rested in the security of these general health precautions and the filtered water supply.

To-day there are twenty-six miles of separate sewers in the borough whose diameters range from six inch to twenty-four inch. There are two outlets to the system both into the creek and one of them said to be twenty inches in diameter is within the borough near Negley Avenue and serves the part of the municipality lying south of the creek, and the other as twenty-four inch pipe serving the larger portion of the borough north of the creek and emptying into it in Butler Township at a point about half a mile below borough limits. Roof water connection to the sewers are prohibited by ordinance; there are said to be no street gutter inlets. The sewers are quite modern, they having been first installed in eighteen hundred and ninety. Flush tanks are located at summits, ventilation is effected through perforated manhole covers and of the total population of ten thousand in the present sewer district it is estimated that a large proportion contribute to the system.

Below Butler the Conoquenessing Creek follows a winding but a general westerly course and enters the Beaver River about at the boundary line between Lawrence and Beaver Counties having traversed a total distance of about thirty-two miles. Seventeen miles below Butler on the stream is the borough of Zelienople and near the mouth of the stream is the borough of Ellwood City at which places the public are supplied with water taken from the creek unfiltered. However, at the former place it is only during emergencies that recourse is had to the creek water. When the Butler epidemic was at its height there was an increased typhoid fever rate at Zelienople and Ellwood City.

The petitioners represent that great necessity exists for the extension of sanitary sewers on cross streets to afford sewerage for new buildings being erected and to care for the rapidly increasing population of the town. Particular mention is made of the need of a sewer in Morton Avenue from Main Street easterly. It is to be eight inches in diameter and will empty into the Main Street sewer which is a part of the sewer system in the district south of the creek whose outlet is within the borough near Negley Avenue. It appears that cess-pools along this avenue are the cause of constant complaint to the city health officials. These cess-pools overflow into the street gutters. There are a number of new buildings erected there also and no provision has been

made for other disposal of sewage than into the proposed pipe line. A similar state of affairs exists on Maple Avenue, and Wallula Avenue in said district and is proposed to lay therein, eight inch sewers. The majority of the abutting property owners have petitioned council for these three sewers, the money is available and the work will be started as soon as a permit be issued therefor. The total length of the three lateral sewers thus proposed for immediate construction is approximately one-half mile and to be connected therewith are about seventy buildings all dwellings.

It is reported that the assessed valuation of Butler is eight million five hundred thousand dollars and that the bonded indebtedness is one hundred and fifty-six thousand, so if these figures be correct the municipality has a borrowing capacity of four hundred and thirty-nine thousand. It is evident therefor, that the community is amply able to bear the expense of works necessary to provide for the treatment of the sewage before it be discharged into the waters of the State. It is also evident that the interests of the public health demand that the borough sewage shall cease to be discharged into the Conoquenessing Creek or its tributaries at the earliest practicable moment. It is also further evident that there is a pressing demand for the sewers in the three avenues mentioned by the petitioners and that the sewage from the buildings to be connected with the said sewers will not measurably increase the present sewage pollution of the creek or the menace to the health and life of the inhabitants of the down stream proprietors and municipalities who use the creek water for drinking purposes.

The employment of an expert skilled in the design of collecting and sewage purification works by the borough and the submission of plans to the Commissioner of Health for approval sufficiently early for a possible vote to be taken in the spring of nineteen hundred and eight of the question of a bond issue for sewage disposal purposes, would appear to be the only warrant for a permit from the State authorities for the discharge of sewage in Butler borough into the waters of the State. No where in the Commonwealth should the necessity for the proper disposal of sewage appeal to the tax payers more than in the borough of Butler. And the local authorities must appreciate the position which consistency requires that the State should assume respecting the protection of the water supply of the municipalities down stream.

The local problem of how best to dispose of Butler's sewage will be rendered much easier of solution by reason of the fact that the existing sewers receive sewage only. Detail plans of the system however, and a satisfactory report thereof have not been filed in the Department of Health.

It has been unanimously agreed that a permit be issued and such permit is hereby and herein issued to the borough of Butler for the construction of the proposed sewers in Morton, Maple and Wallula Avenues, and for the present in these avenues only, and that the permit be issued under the following conditions and stipulations:

FIRST: That on or before January first nineteen hundred and eight, a complete map of the borough shall be prepared showing the existing sewers, their size and grades and also the same with respect to extensions of the system proposed all of which shall be filed in the office of the Commissioner of Health with a satisfactory report.

SECOND: On or before January first, nineteen hundred and eight the borough shall submit to the Commissioner of Health for approval detail plans and specifications and a report for sewage purification works for the treatment of the borough's sewage.

THIRD: This permit to extend the existing sewer system and to discharge the sewage therefrom into the waters of the State shall cease on the first day of January nineteen hundred and eight. If at that time the other terms of this permit shall have been complied with, then the Commissioner of Health will extend the time and fix a date to be unanimously agreed upon by the Governor, Attorney General and Commissioner of Health on or before which the purification works shall be erected and put in commission, during which time the borough's sewage may continue to be discharged into the waters of the State.

The attention of the local authorities is called to the fact that this permit before being operative must be recorded in the office of the Recorder of Deeds of Butler County.

Furthermore, on submission of the plan of the borough sewer system herein called for and showing thereon the proposed sewer extensions of the comprehensive system, the Commissioner of Health will act upon the application for permission to make lateral sewer extensions in accordance with this plan from time to time, as necessity may require.

Harrisburg, Pa., November 23rd, 1907.

CAMBRIDGE SPRINGS, CRAWFORD COUNTY.

This application was made by the borough of Cambridge Springs, Crawford County and is for permission to extend the sewer system of said borough and to discharge sewage therefrom into the waters of the State.

It appears that the borough of Cambridge Springs complied with the law and filed a plan of its sewer system in June of Nineteen hundred and five.

This municipality is located in the northern part of Crawford County, on French Creek which has a large watershed above Cambridge Springs, and below, it flows southerly through the central part of the county into Venango County where it joins the Allegheny River.

The fluctuation in population is abnormal owing to the reports of people to Cambridge Springs for rest and recreation. The normal population is approximately eighteen hundred but during July, August and September the population increases to about forty-five hundred.

The mineral springs of the borough are noted for their curative properties. Individuals afflicted with rheumatism and kindred diseases come here to be rejuvenated. There are excellent hotels in the borough, the topography is hilly except that part north of French Creek which is low ground.

It is said that there has been very little typhoid fever at Cambridge Springs during the last ten or fifteen years.

The borough owns its own water supply. There are about four miles of distributing mains whose sizes vary from four to eight inches in diameter. The water is taken from French Creek to the pumping station located on the low ground north of French Creek from whence it is lifted into a wooden tank located on the hill south of the creek. This tank holds about one hundred thousand gallons and supplies a distributing system.

Five wells were drilled in the vicinity of the pumping station and the water therefrom was pumped to the stand-pipe and borough; but it became unpalatable and in consequence the borough authorities decided to adandon the well water and at present the water supply is taken wholly from French Creek at a point about eight hundred feet below the Main Street bridge. This water is supplied for domestic purposes to about seventy per cent. of the entire population.

The fact is noted that there are numerous driven wells in the borough, and it is stated that such wells are scattered over the whole town and that practically all drinking water is derived from these private wells, the public supply being used only for the meaner domestic purposes.

French Creek for a distance of about three miles above and three miles below Cambridge Springs is extremely sluggish in flow, from six to twenty feet deep and has the appearance more of a pond than a flowing river. Summer visitors extensively engage in the pastime of boating and canoeing on the creek. There are numerous picnic grounds on either bank of the stream for several miles above and below the borough.

Owing to the pollution of the waters by sewage, they are not fit to be used for domestic purposes unless first filtered. The absence of typhoid fever from the community is noteworthy and may be accounted for by the fact that drinking water is so universally taken from individual wells. However, the use of French Creek water for the inferior domestic purposes is a menace. The washing of food stuffs, eaten in the raw state, by water taken from French Creek during a typhoid fever epidemic would be liable to materially increase the spread of the disease.

The sewerage system has been built by piecemeal at different times by different engineers during the past ten years. There are no records or plans or profiles of the existing sewers.

There are three sewer outlets into French Creek. Two of them, Grant Street and North Side sewer district outlets are below the water works intake and the south Main Street district outlet is above the water works intake. The North Side district outlet is eighteen inches in diameter. In the system which it drains there are all told forty-two hundred feet of pipe, the smallest being twelve inches in diameter. The average population served during most of the year is three hundred but during the summer months, it is about eight hundred. The sewage from this number of people goes into French Creek about three hundred feet below the water works intake.

Grant Street sewer district outlet is eighteen inches in diameter. In the district which is south of French Creek, there is a total length of forty-eight hundred feet of pipe sewers, the smallest of which is eight inches in diameter. The winter population served by these sewers is about four hundred, but the summer population is nine hundred. The average from this number of people discharges into French Creek at a point about one thousand feet below the water works intake.

The South Main Street district outlet is twenty-four inches in diameter. This district is also on the south side of the creek. At present it comprises a total length of seventy-six hundred feet of which the smallest pipe is eight inches in diameter. The residual population served thereby is six hundred and the summer population twenty-six hundred.

Approximately two-thirds of the perminent population of the borough live in dwellings connected with the sewer system. The remainder have privies. The influx of summer visitors is to hotels and buildings having sewer connections. The sewage of about twenty-six hundred people is discharged through the

South Main Street outlet into French Creek about four hundred feet above the water works intake. So it is seen that the public water supply is menaced by the disposal into the river and above the water works intake (within four hundred feet thereof) of the sewage of over fifty per cent. of the borough's population.

The borough council wishes to lay sewers in three streets namely seven hundred and fifty feet twelve inch sewer in Church Street, three hundred and eighty-two feet six inch in Spring Street and one thousand four hundred and twenty-seven feet of six inch and eight inch sewer in Thomas Street. These sewers are an extension of the sewers in the South Main Street district, whose outlet is into French Creek above the water works intake. The population living along the line of the proposed sewers is about two hundred. In the future it may be six hundred. These sewers, as do all of the sewers of the borough, are intended to take storm water as well as house sewage.

The question in this case is whether the public health demands that the borough should be permitted to add to the pollution of its own water works system.

The assessed valuation of the borough was in Nineteen hundred and six about seven hundred thousand dollars. The present bonded indebtedness amounts to fourty thousand dollars, so it is reported. There is, therefore, nine thousand dollars further indebtedness possible under the seven per cent. limitation. It is only by re-assessment that public moneys can be had with which to adequately protect the public health of the borough so far as its water works and sewer system is concerned. The water consumption of the borough averages one hundred and twenty thousand gallons daily. The water should be filtered and the cost of installing filter works would probably use up ten thousand dollars.

Besides the filtering of the water supply, no sewage should be allowed to empty into the creek above the water works intake, and its permanent discharge into the stream below the intake ought not to be permitted because such discharge menaces the supply of towns farther down stream. The sewage pollution of the creek above Cambridge Springs should be stopped, but this could not be consistently required if Cambridge Springs were permitted to pollute the waters by its own sewage. In justice to the water takers, the community at large and the interests of the public health in general, this case seems to demand three things; first, that the water supply be filtered; second that pollution of this supply by sewage be stopped; and third, that the sewage of the borough be intercepted and conveyed to some point below the water works intake and there purified before the liquid is discharged into French Creekk.

The population in boroughs and villages on French Creek above Cambridge Springs, within a radius of thirty miles comprising six places, was in Nineteen hundred, forty-eight thousand and fifty-eight.

French Creek drains an area of about five hundred and seventy square miles above Cambridge Springs. There are no good records of its dry weather yield, but judging from the yield of the Shenango River which has a watershed of about six hundred square miles and is known to have been reduced to ten million gallons daily, the minimum flow of French Creek at Cambridge Springs is in the neighborhood of fifteen to twenty-five cubic feet per second which is sufficient to dilute the sewage there to a point obviating a nuisance. During August the volume of house sewage going into French Creek at Cambridge Springs is approximately four hundred and thirty thousand gallons daily, which, on the basis of the average dry weather flow of the creek gives a dilution of the sewage about thirty-seven times. The river pools extend several miles down stream, and in this distance sedimentation and some purification occurs without doubt, so that the municipalities below on the stream do not have occasion to complain of a nuisance resulting from any act of Cambridge Springs. Neither do the many picnic parties on the banks of the creek pollute the water sufficiently to cause any nuisance which is the occasion for complaint.

The municipalities on French Creek below Cambridge Springs is shown in the following table:

Municipality.	Population.	Miles below Cambridge Springs.
Venango Borough,	233	4
Saegertown Borough,	607	8
Meadville City,	10,291	15
Vallonia,	533	15
Cochranton Borough,	640	26
Utica Borough,	268	34
Franklin City,	7,317	40
Allegheny River,	.....	40

Franklin City has a public water supply whose source is back in the mountains or hillsides, but the supply is inadequate for the summer demand, and at the present time about one-sixth of the daily consumption is taken from the French Creek and mingled with the other water.

The Commissioner of Health could not reason why the State should be put in the position of approving the discharge of sewage into French Creek within four hundred feet above the borough's water works intake, and, therefore, it was thought that plans should be prepared for the conveying of the sewage of the town below the water works intake. Even at this point there is danger if sewage be permitted to go into the pool out of which water for domestic uses is taken. Clearly, the borough needs a filter plant, and the Commissioner of Health gave a hearing to the borough authorities on July eleventh Nineteen hundred and six, to ascertain why permission to build the sewers should not be withheld until the borough shall have made plans and profiles of the existing sewers and plans and profiles of a comprehensive system of sewers and sewage disposal works for the entire borough, so that the present sewers may discharge their contents into sewers which shall extend below the water works intake and be a part of the system which contemplates the treatment of the sewage. Also, the object of the hearing was to show reason, if any there be, why the borough should not install a water filtration plant in connection with its public water works system.

It appeared at this time that the local authorities were planning to extend the water works intake pipe about twelve hundred feet up stream in the bed of the creek to a point above any sewer outlet of Cambridge Springs. This point, however, would be below where the sewage from Union City and other places is discharged into the creek.

On advice of the Commissioner of Health the borough employed a sanitary engineer to study the whole sewer and water question and submit plans to the Department, and the Chief Engineer of the State Department of Health went to Cambridge Springs and advised and consulted with the borough's expert relative to the water and sewerage problem. As late as November fifteenth, the borough had not submitted the detail information called for. However, on December fourth, questions specifically asked by the Department had been answered, but the instructions given to the borough's expert during the summer calling for the submission of various plans had not been submitted, thereby placing the Department in the position of having to assume the responsibility for initiatory work, or else decline to further act in the matter until complete plans were submitted by the borough.

To assist the borough authorities in arriving at some definite plan which their engineer can work up and submit for approval, it may be well to suggest that a mechanical filter plant, two units, each three hundred thousand gallons capacity, sedimentation tank and covered filter water basin, capacity two hundred and fifty thousand gallons, can be provided at the present pumping station for an estimated cost of sixteen thousand dollars of which six thousand dollars might be enough to pay for the filters.

Also an intercepting sewer can be built along the bank of French Creek to connect with a syphon under the stream to a pump well to be located on the flats near the water works pumping station, together with a force main to sewage disposal works on the south bank of the creek distant one-half mile from the center of the town, for an estimated cost of forty-one thousand dollars.

Detail studies by a competent engineer accustomed to this kind of work are necessary to determine the best and most economical plan.

The town does not have money enough under its present assessed valuation, which is low, to pay for water and sewage purification works. The public health stands more in need of the water purification plant, but both improvements are needed, and could be afforded were the assessed valuation of the town to be materially increased. Such a policy would prove to be a sound business one and it should be commended to the thoughtful consideration of the local authorities.

It has been unanimously agreed that the interests of the public health demand that permission be withheld to extend the sewers in the borough until the borough is prepared to intercept and convey the sewage to some point below the water works intake and there purifiy it before the liquid is discharged into French Creek according to plans to be approved by the State Department of Health. Provided, however, that sewage may be temporarily permitted to discharge into French Creek at some point below the water works intake to be approved by the Commissioner of Health if the borough is, during this time, filtering French Creek water supplied by it to the consumers in the borough.

It has also been unanimously agreed that the borough authorities be notified that the use of French Creek water as a source of public supply, unless the water be filtered, is prejudicial to public health. Furthermore, that the authorities be requested to adopt ways and means to bring about at the earliest practicable moment the construction of a water filtration plant according to plans to be approved by the State Department of Health.

Harrisburg, Pa., April 29, 1907.

CANTON, BRADFORD COUNTY.

This application was made by the borough of Canton, Bradford county and is for permission to extend a part of its sewer system.

It appears that Canton borough is located in the township of Canton in the southwest corner of Bradford county on the head waters of Towanda Creek, and on the Northern Central Division of the Pennsylvania Railroad leading from Williamsport, Pennsylvania, to Elmira, New York.

The town at present has a population of about eighteen hundred. The place is a trading point for the surrounding country, and it has several manufactories, the most important being the Bellmar Clothes Hangers Manufacturing Company, employing, it is reported, one hundred hands.

The prospects for increased growth are those incident to most rural communities of a similar size, and may be judged somewhat by the past. The records of the United States Census show the population in nineteen hundred to have been one thousand five hundred and twenty-five; in eighteen hundred and ninety, one thousand three hundred and ninety-three, and in eighteen hundred and eighty, one thousand one hundred and ninety-four.

Surrounded on the north, west and south by mountains whose summits comprise the boundaries of a drainage area of twenty-five square miles in which numerous streams rise, uniting to form the Towanda Creek the borough marks the place where the stream emerges from the mountains into a long, wide, fertile valley. The course is a general northeasterly one from Canton twenty-five miles to the Susquehanna River. The point of entrance is one and five-tenths miles down stream from Towanda borough.

Monroe is the only municipal corporation on Towanda Creek besides Canton. It is three miles from the mouth of the stream. So far as the Department is informed, no public water supply is taken from the stream, but it meanders through cultivated lands and pastures, and thus affords water for stock.

That part of the valley lying within Canton borough, though narrow, is flat and the stream flow is sluggish. Back from it short distances, brooks and runs gather water at elevation several hundred feet above the valley, and in time of pronounced rainfall, torrents are suddenly poured forth with such force as to swell the stream and make it rapid, this sweeping force brings heavy loads of sand and gravel from the mountainsides to be deposited along the flat courses of the creek which operation aids in the formation of succession of pools along the Towanda. The average fall of the stream is about thirteen feet per mile, which if it were a uniform slope, would give a rapid current from Canton to the Susquehanna River. However, the pools in the channel bed create alternate currents.

There is a small strip of land south of the creek within the borough where there are a few houses. This land rises precipitously back to the summits of the mountains about a mile distant, on which there is a lake from which a part of the borough's water supply is obtained.

The village lies north of the creek and east and south of the railroad on a pronounced incline to the creek. In the high part of the village near the northern boundary of the borough, there is a stream known as Mill Creek which comes down from the mountain two and one-half miles northwest through a narrow and quite deep gorge until it reaches the borough, through which it continues its southeasterly course at an elevation of from one hundred to fifty feet above the valley of the Towanda Creek until it reaches this valley about one mile below Canton. The land north of Mill Creek drains towards it, and it is largely precipitous.

Between Mill Creek and the main stream, in the western half of the borough, there is another mountain stream, rapid in descent. It drains the undeveloped land of the municipality.

Towanda street, otherwise called Main street, is the principal thoroughfare in the Tawanda Valley. It leads from the county seat of Bradford (Towanda borough) to the county seat of Lycoming (Williamsport city). This thoroughfare has been dominated a State highway and portions of it in the two counties have already been macadamized. The State is now reconstructing the road in the vicinity of Canton borough.

There are a few driven or drilled wells in the village and one spring in the upper part of town is reported. Otherwise the citizens obtain their water supply from the Citizens Water Company. There are two sources.

The main and original source is Mill Creek. Across it about one-half mile outside the borough line two small intake dams exist. The upper one is fifty feet up stream from the lower one. The former consists of a masonry wall about eight feet above the bed of the stream and thirty feet across it. This structure dams the water back about one hundred feet.

The lower dam is a stone structure about eight feet high and forty feet long. At one side of it there is a partition wall forming an enclosure intended to serve as an inlet basin to the water pipe which starts in it and extends down the gorge to the town. The water level of this main dam is said to be one hundred and ninety-five feet above Main street of the borough. Over the end of the intake pipe there is a copper screen. In the intake chamber filtering material has been placed at times for the purpose of filtration of the water during its passage from the main portion of the reservoir to the supply main.

On the day of the Department's inspection the filtering material had been previously removed, evidently by a wash out, and the intake pipe was exposed to view in the water.

The area of the water-shed above these dams is about two square miles. For over a mile above the dams the creek is in a very deep and narrow gorge. The summit of the mountains on either side is approximately three hundred feet higher and not over one-half mile distant from the stream. The velocity is therefore rapid and during excessive rainfalls the rapidity and force is formidable. The upper dam is constructed for or serves the purpose of a catch basin. It is nearly filled up with gravel, and debris. On the day of inspection the odor of organic decomposition was pronounced and offensive. The flushing of some of this fermenting material over the upper dam into the lower basin and thence to the supply main might easily occur and create wholesale bowel troubles, if nothing more, among the consumers in the borough.

The lower dam has also caused the accumulation of objectionable matter to a depth of from two to three feet and also needs to be cleaned out.

Occasionally the water has such a disagreeable odor, and also discoloration, that consumers particular about these things refrain from using the household bath.

It is also reported that frequent flushing of the street mains is necessary to keep the pipes open.

In eighteen hundred and eighty-nine the company supplemented the Mill Creek supply by obtaining water from Lake Nephawin. This body of water, previously mentioned, has an area of about seventy acres, is elevated about two hundred and fifty feet above the borough and is surrounded by steep hills on all sides, except immediately at the outlet. The lake is fed by springs, there being no visable inlet. The outlet is small, steep generally and originally a six inch supply main extended from this lake to the town and the water was used only during the summer, when Mill Creek supply became insufficient. However, in eighteen hundred and ninety-six the water of this lake, was condemned as unsuitable without filtration for a public supply. At the present time there is installed and in use part way down the hill below the lake a mechanical filter plant, installed by the New York Filter Company, consisting of a wooden, circular settling and coagulant tank, capacity ten thousand gallons, also a sand filter tank of same construction and size, housed over. The filtered water is delivered into a masonry tank forty feet square and ten feet deep, approximate dimensions, whose high water level is the same as the elevation of the intake dam on Mill Creek. The filter plant is not always used when water is being drawn from the lake. The use is determined by the amount of color and odor in the water.

On the water shed of the lake at the summit about eight hundred feet distant is Lake Breeze Hotel, a commodious hostlery kept open the year round and well patronized in the summer season. Towards the lake there is a percolating cess-pool into which the hotel sewage is discharged. There appears to be no reason why the sewage should not be discharged on the slope of the summit leading away from the lake.

About five hundred feet from the northwest shore of the lake on the steep hill sides there is a slaughter house, owned by P. W. Terry, and a yard in which hogs and other stock to be slaughtered are kept, through which yard a ravine passes. The waste from the slaughtering house is thrown out on the ground. The wash from the yard and slaughter house all goes into the lake.

There are several cottages located on the shores.

Inspection of Mill Creek water-shed revealed the following menaces, six in all, the first one being located about one-half mile above the dam, the last one about one and a half miles above the dam, and the others about equal distances between.

At John Fennell's house there is a privy built on loose stone with no pit, about one hundred and fifty feet from Mill Creek, surface drainage from the privy flowing directly into the stream.

A similar privy at George Brown's is about ten feet from a spring run which flows directly into Mill Creek.

At Robert Boyd's farm a privy without any pit is located about twenty feet from a small ravine leading into Mill Creek about one thousand feet distant. A pig pen is in the ravine. The drainage from the pen and the privy passes rapidly down the steep slope to the main stream.

On P. Furman's property a pig pen and barn yard poorly kept, are located along a branch of Mill Creek and the waters are unnecessarily polluted thereby.

At A. Van Sycle's property there is a privy three hundred feet from Mill Creek. It has no pit, the surface drainage from it rapidly reaching the main stream.

The last occupied property on the water-shed is that of O. J. Smith's. Here clothes are washed in the yard and the waste water goes to a ravine leading to the main stream. A privy on its banks has no pit.

In case of the existence of an infectious disease at any of the above places, the probability amounts to almost a certainty that the water supply of Canton would become poisoned. The least that can be done in the line of prevention is the installation of proper receptacles for sewage and organic wastes. It appears that the water company does not own any of the water-shed.

Individual members of council represent that the citizens of the borough desire to receive the benefits of whatever protection from menaces to the water supply the Commissioner of Health may be able to afford. In extending this protection to Canton the State could not consistently at the same time permit the borough of Canton to increase the menace to the water supply of municipalities who draw their sources from streams into which the sewage of Canton flows, either directly or indirectly.

Public sewers were first installed in Canton in nineteen hundred and two. At the present time, there are about sixty connections. The total number of buildings in the municipality is reported to be four hundred and twenty-five. Sewage and waste from the buildings not connected with the sewers are discharged into privies and cesspools of which there are approximately forty cesspools. The town presents a neat appearance, and the necessity for sewer extension is not to obviate existing nuisances but that demanded to keep pace with the requirements of modern sanitation.

The sewer system was designed to take both sewage and storm water, the sizes ranging from eight inches to twenty-four inches in diameter. According to the plan all of the sewage was to be conveyed to one point and discharged into the creek below the town. However, the plan was not followed, and the existing outlet is into the creek in the center of the borough opposite the foot of Minnaqua avenue. This is the principal business street extending up the hill at right angles to Main street. There are no buildings in the vicinity of the outlet. In the absence of a plan showing existing sewers, and with their locations in dispute among the local apthorities, the Department is not informed where such sewers are. The plan filed by the borough show the entire system as originally designed. There are two private sewers into the creek. One from the Lewis Building on Main street and one from the Clothes Hangers Factory on Second street.

The applicants state that a contract is to be let by the State Highway Department for the building of a permanent road on Main street in the borough, and that it is therefore necessary to lay a sewer in Main street according to the original plans where a sewer has not been constructed. The borough also asked permission to build an outlet from the Main street sewer in Washington street to the creek. It is also stated that there are about eighty possible sewer connections in the proposed district, and that twenty connections are expected the first year. The sewers are to be combined and to range in sizes from twelve inches to eighteen inches in diameter.

Towanda Creek is compartively one of the pure streams of the State. Its water-shed of two hundred and eighty square miles is not now densely populated. Therefore, it is an easy matter to preserve the purity of this stream. The small amount of sewage from Canton borough now discharged into the creek creates a sewage pool in the sluggish waters of the stream. But showers flush out the sewage and in consequence complaints are not known to have been made against this disposal of the village sewage. However, pathogenic poison may be transmitted by the stream into the Susquehanna River and in a few hours from the time it leaves Canton sewers be introduced into the water pipe system of the city of Wilkes-Barre and thus menace the lives of the citizens of that municipality

The petitioners nowhere show why the interests of the public health demand that Canton sewage should be discharged into the stream. It appears from reports, if true, that the assessed valuation of the borough is four hundred and fifty-eight thousand dollars and that its bonded indebtedness is five thousand five hundred dollars, and in consequence the municipality can borrow in the neighborhood of twenty-eight thousand dollars. This sum should be more than ample to pay for sewer extensions and sewage disposal works, provided storm water can be eliminated from the sewer system.

The upper part of the town is naturally drained by Mill creek, and it is not a difficult matter to provide surface drainage for any part of the town. The existing sewers may be incorporated quite largely into a sewer system for the entire borough from which roof and street water shall be excluded. By a judicious design which as engineer skilled in such work would be able to evolve, means can be provided for the separation of sewage from storm water whereby the former shall be conveyed to a sewage treatment plant and the latter discharged at convenient points into the natural water courses within the borough under plans which will prove economical in first construction and efficient in operation.

While the citizens of Canton may well demand State protection from the dangers of a menace to their public water supply, in turn said citizens should consistently provide such works as will assure the protection of other water supplies from pollution by Canton's sewage. The sewer in Main street may be laid without injury to anybody and to the benefit of the traveling public, provided the building of the State Highway be contigent on this sewer; but the pipe should be laid and not used for the present.

It has been determined that the interest of the public health demand that a permit be granted and it is hereby and herein granted to the borough of Canton for the construction of a small sanitary sewer in the unsewered portion of

Main street and there only, and that a permit for the general extension of sewers in the borough is hereby withheld for the present and under the following conditions and stipulations:

FIRST: That on or before May first, nineteen hundred and eight, the borough shall prepare a plan of the existing sewers, showing their locations, sizes and grades, manholes and inlets and file the same in the State Department of Health, together with such other information in connection therewith, as may be desired by the Commissioner. And on or before said date, the borough shall submit a plan of sewage disposal works for the treatment of all of the sewage of the borough, together with plans for the collection and conveyance of the sewage of the entire borough to such works.

SECOND: When such plans shall have been submitted, the Commissioner of Health may grant a permit for the extension of the borough sewer system and fix the time in which the disposal works shall be constructed.

THIRD: It is expressly stipulated that the sewer proposed to be constructed in Main street in conjunction with the State Highway improvement, and herein approved shall not be used and no sewage shall be introduced into it until plans for a general sewer system and sewage purification works shall have been submitted to and approved by the Commissioner of Health.

The local authorities are hereby advised that the Commissioner of Health will request the Citizens Water Company to make monthly inspections of the property on the water-sheds and to submit a report thereof to the State Department of Health. Also that said company will be requested to clean out the reservoir and remove all objectional matter therefrom. Also that the State will issue notices for abatement of nuisances on the water-sheds and attend to the removal of said nuisances. Hereafter it is advisable that the local board of health shall make monthly inspections of the occupied estates on the water-sheds and file a report thereof to the State Department of Health.

Harrisburg, Pa., July 26th, 1907.

CARLISLE, CUMBERLAND COUNTY.

This application was made by the borough of Carlisle, Cumberland county and is for permission to construct a system of sewerage and sewage disposal works in said borough.

It appears that the borough of Carlisle is located in the central part of Cumberland county, of which it is the county seat, about twenty miles west of Harrisburg. Its present population including five hundred students of Dickinson College is estimated to be twelve thousand. In nineteen hundred it was nine thousand six hundred and twenty-six.

The incorporated territory lies wholly within the water-shed of the Conodoguinet Creek which rises in Franklin county and flows easterly passing north of and near the borough lines and empties into the Susquehanna River opposite the city of Harrisburg. This stream has many tributaries, those coming from the south rising in limestone springs and those from the north draining slate and sandstone formations.

One of the limestone springs tributaries rises in the hillsides south of Carlisle and flows northerly through the borough and immediately east of the built up part joining the Conodoguinet Creek two miles and a quarter below the borough at the village of Middlesex. The stream in the upper part of this valley is known as Bonny Brook and through and below the borough it is known as Letort Spring. The entire valley and the lands about Carlisle south of the creek are extremely fertile and under a high state of cultivation, and any gross pollution of the natural water courses by sewage would be a serious injury to agricultural pursuits and to the public health as well. The built up part of the borough is situated on the slight divide between the main creek and Letort spring, but the greater part of it slopes easterly and is drained by said Spring Run. However, the indicated growth of the town will be in the opposite direction towards the Conodoguinet Creek. The transverse grades on the divide afford good surface drainage, but in the south part of the town and along Letort Spring the valley is very flat, and this obtains all the way to the main creek.

Carlisle has always been a substantial and prosperous community. Today it has a wide variety of thriving industries, among which are the manufacture of boots and shoes, silk goods, shirts, paper boxes, wood workings, frogs and switches. None of them use large quantities of water or produce liquid wastes which would characterize the town sewage. The universal custom for the manufacturies and for all buildings is to deposit kitchen wastes and sewage into so-called cesspools which are principally holes drilled into the limestone rock. There are reported to be few outside privies. It has been observed that cesspools clog up after more or less use and new ones have to be provided on the property. This is true to such an extent that on many estates this method of disposal has become exhausted and the ground literally filled with sewage matter. It is entirely probable that after many decades of use the capacity of the limestone crevices underlying Carlisle to further and properly dispose of sewage has become overtaxed, and in consequence a widespread epidemic is impending. At Dickinson College, which is located in the central

part of the town, there is a private sewer discharging into one of the sinkholes, and it appears that this crevice satisfactorily receives thus far all drainage delivered to it, including considerable surface water. North of the town near the bank of the Conodoguinet Creek there is a large cave which has more than local fame for its size. It extends southerly towards the borough. There may be other subterranean passages leading towards the creek and delivering more or less water to it as is usually the case in limestone formations. When these channels are tapped, they prove capable of removing large quantities of sewage, but there is no way to regulate or control the matter after being so disposed of. It may subsequently make its appearance in surface streams to the injury of cattle pastured along the banks. A public milk supply might easily be polluted in this way. If there are other sewers in the borough, the Department is not at present advised of the fact.

The inhabitants obtain their water supply chiefly from the Carlisle Gas and Water Company. Water is drawn from the Conodoguinet Creek at the dam north of the town just below Carlisle cave and raised by water power to three Jewell gravity mechanical filters, located on a hill between the pump house and the town. The filtered water is discharged into open storage reservoirs, two in number, having a combined capacity of about three million five hundred thousand gallons, from which it is distributed to the town by gravity. It is reported that a chemist from Dickinson college makes regular analyses and suggests corrective measures relative to the operation of the filter plant when he deems such to be necessary. The creek water always contains some suspended clayey particles and during rainy weather the turbidity is excessively high. The filter plant in all events successfully clarifies the water even in high bacteriological efficiency be not attained. The water company claims that no disease has ever been traced to the water furnished by it to the public. But such cases of typhoid attributable to drinking water have been traced to springs and wells in the town. Not all of the private wells have been closed up especially in the outskirts. Water drawn from the ground anywhere within or without Carlisle in the limestone formation is at least auspicious. Safety requires that all such sources should be abandoned.

The committee of public safety of the borough corporation taking cognizance of numerous protests against the pollution of the borough's water supply, and having no jurisdiction thereover, recently requested the Commissioner of Health to give consideration to the matter and to cause the removal of all menaces and nuisances on the water shed.

The proposed sewer system is to be laid out to embrace all of the borough now built up and for future development. The sewers are to remove sewage only. The sizes will range from eight to twenty-four inches in diameter and there being nineteen and twelve-hundredths miles in the system, of which about seventy-one thousand feet will be eight inch pipe, twelve hundred feet twelve inch pipe, three thousand feet fifteen inch pipe, sixty-nine hundred feet eighteen inch pipe and forty-eight hundred feet twenty-four inch pipe.

The twenty-four inch pipe is the outfall sewer, which extends down the valley of Letort Spring Run to the disposal works. It will receive the flow from two district mains, each eighteen inches in diameter; one serving the district in the town lying north of High Street and along Letort Spring Run. These two sewers unite to form the outfall east of the run and north of the Pennsylvania Railroad, on land owned by the Federal Government upon which is located the Carlisle Indian School. Part of this tract lies within the borough, but the larger portion of it is outside in Middlesex township. At this institution at times there are as many as one thousand students. The buildings are sewered and the drainage therefrom, including sewage and roof water, is discharged through a twelve inch pipe into the run on adjacent land at a point about four hundred feet above the site of the proposed municipal sewage works.

The topography of the ground within the borough permits the collection of the sewage at one point in conduits whose grades will be sufficient to maintain a scouring velocity, and this can be accomplished without any unreasonable deep trenching. The public square at High and Hanover Streets in the summit, from which point the ground slopes in all directions leaving one district only east of Fair Ground road between Hamilton and Hanover Streets, which is difficult to drain. Here a low sump exists and to get the sewage from this district, it has been necessary to provide for a fourteen foot cut crossing Hanover Street easterly to the Main outfall.

It appears that the depth of the sewers has been carefully predetermined by measurements of existing cellars in the entire borough. Also boring for rock at every street intersection and points in the middle of each block have been made to render estimates of the cost of sewer construction possible. Wherever cellars were found wet, the sewer is to be placed deep enough to drain them. Lateral sewers are to be placed about six feet below street grades. Where cellar drains are provided, each is to be trapped between the house and sewer and such a line is to be independent of the sewer connection proper.

The sewers are to be ventilated through perforated manhole covers. These structures for inspection and ventilation are to be placed at street intersec-

tions where two or more sewers join and every change in line and grade. To prevent street dirt from getting into the sewers through the manhole covers an iron bucket is to be suspended in the manhole under the cover.

Flush tanks are to be placed at most of the dead ends of the sewers where the velocity flow will be under seven feet per second. Elsewhere the dead ends of the sewers will terminate in a lamphole eight inches in diameter reaching to the surface of the street and properly protect it. The rain leader of the building nearest to these lampholes is to be connected with the house sewer connection to insure a thorough flushing of the dead end during every rainstorm. About twenty-three such flushing arrangements are contemplated in the system.

It is estimated that Carlisle will have a population of thirty thousand in nineteen hundred and forty. The main sewers and outfall are designated on this basis and on the further basis of a daily contribution of eighty gallons per inhabitant, one-half being used in eight hours, and in addition for leakage into the sewers about one hundred and twenty thousand gallons daily, which represents a total maximum flow of three million six hundred and forty thousand gallons, or six cubic feet per second. The outfall with a grade of one foot in eleven hundred and fifty will be slightly in excess of this capacity.

The lateral sewers are ample in size for all purposes and the entire system is comprehensive and well adapted to the needs of the borough. Each particular house connection is to be five inches in diameter and the minimum grade is to be one-quarter of an inch to a foot. As far as possible this pipe is to be a straight line from the inside of the cellar wall to the street sewer, and on its end in the house is to be placed a handhole.

In the valley of Letort Spring Run in Middlesex township on property of the County Home and Insane Asylum there is a secluded spot of the banks of the run adapted for purposes of sewage disposal. The site is one thousand feet from the nearest dwelling. Here the ground has a gentle slope adapted to economical installation of disposal works. It is purposed to acquire five acres of this tract.

The petitioners submit for approval plans of two different kinds of sewage purification works. One is a septic tank and sprinkling filter plant and the other is a septic tank and double contact plant. In both, the preparatory treatment in the septic tank is the same and the arrangements therefore are the same. The outfall sewer ends at elevation four hundred and thirty-six and nine-tenths in a screen chamber provided to catch the heavier solid matters. The sewage will then flow to either one of two distributing troughs extending nearly across the ends and outside of two open septic tanks to be built side by side, each twenty-five feet wide and one hundred feet long interior dimensions and eight feet deep to flow line. The sewage will be introduced into each tank through four cast iron pipes submerged to within two and five-tenths feet of the bottom, the pipes being equally spaced across the inlet end of each tank. At twenty-five foot intervals across each tank, a baffle wall suspended to a depth of one and five-tenths feet below the flood line, which is to be elevation four hundred and thirty-seven and four-tenths are arranged. Six feet from the inlet and of wall five feet high is to extend across each tank and at the outlet end a suspended baffle wall is to be carried across each tank to serve as a non-distributing outlet conduit. It is to be submerged two and five-tenths feet below the water level. The effluent is to pass up under this wall and over the weir extending the full length of the end of each tank and thence into a dosing conduit which is to pass down in an open channel between the filters. The bottom of this conduit is to be elevation four hundred and thirty-five and nine-tenths. A by-pass pipe for emergency uses is provided from this conduit and also for drawing off the septic tank liquid and discharging it untreated into the creek.

The capacity of these tanks provides for a twelve hour displacement of the contents with a daily flow of six hundred and sixty-six thousand gallons and an eight hours displacement for one million gallons flow. There is provision made for a third tank. The sludge from the screen chamber distributing through and septic tank is to be collected into an outside well and removed by a centrifugal pump, motor driven, to a sludge bed to be built on the meadow nearby. The excavation for the septic tanks is to be used to form the embankment of the sludge bed. Its capacity is to be one and one-third times greater than the full capacity of one septic tank. The contents deposited there are to remain until the liquid has evaporated and the sludge dried out. The residue is to be disposed of in some sanitary manner. This bed is to be located on the immediate bank of the Run.

According to one plan the septic tank effluent is to be delivered through the dosing conduit under a five foot head upon the surface of sprinkling filters. There are to be four of these beds of equal size arranged in order of a square, each bed having a surface of seventy-eight feet by seventy-six feet, and a depth of filtering material of four feet, resting upon a concrete bottom and enclosed within concrete walls. The dosing conduit will be of concrete and is to be built between the first two filter beds, the walls of these beds forming the walls of the conduit. The invert of the latter will be five feet wide, and the flow line in it will be elevation four hundred and thirty-six and nine-tenths or five feet ten inches above the top of the filtering material in the bed.

This material is to consist of a bottom course nine inches thick, of crushed stone, no pieces over two and one-half inches in diameter, supporting a three foot course of crushed stone, no pieces greater than one and twenty-five-hundredths inches in diameter. The top layer sufficient to make the average depth of the bed three and seventy-five-hundredths feet is to be of crushed stone ranging in diameter from one-eighth to one-half inches.

The septic sewage is to be delivered on to each bed through a cast iron main having wrought iron laterals and two inch galvanized iron riser pipes, spaced fifteen feet on centers. On the top of each riser will be adjusted a sprinkling nozzle for the purpose of spraying the sewage over the surface of the filter.

The underdrainage system is to comprise parallel rows of four inch horse-shoe drain tile spaced four feet apart and discharging into the main underdrain built into and just below the foundation and passing down the center of each bed. These underdrains will discharge into a collecting manhole whose bottom elevation is to be four hundred and twenty-four and eighty-seven-hundredths. From here a twenty-four inch pipe will extend down stream from a distance of twenty-eight hundred and fifty feet where its outlet will be sufficiently high to discharge into the run. This fall in this effluent outlet will be one foot in eleven hundred and fifty feet.

Each bed is to be fitted with an Adams Automatic Syphonic Apparatus for feeding each filter intermittently and alternately in cycles of eight hours each or as may be desired and of sufficient capacity to handle one million gallons of sewage each twenty-four hours. These regulating devices are grouped together in the four central corners of the filter bed layout and are to be housed over and protected from the weather. The normal elevation of water in Letort Run is said to be four hundred and twenty-eight and five-tenths which is about level with the bottom of the proposed septic tank and over a foot and a half above the inside floor of the sprinkling filters. This explains the necessity for conveyance of the effluent down the stream to admit of a gravity outlet. It is reported that high water sometimes flood the lowland upon which the plant is to be located. Therefore, all structures are to be made water tight.

The petitioners state that the sprinkling filter plant should accomplish a purification of eighty per cent. of efficiency. The cost of installation is estimated at thirty one thousand gallons, equivalent to a filtration rate of three million gallons per acre daily.

In the older and more thickly built up part of Carlisle lying between East College, North and South Streets, where sewers are very much in demand, and where money will be readily forthcoming to pay for sewers on the betterment or assessment plan, there is a population of about eight thousand. It is expected that the quantity of sewage to be treated from this district will approximate six hundred thousand gallons daily. So it appears that the capacities of the septic tank and sprinkling filters would be ample to serve the flow of sewage estimated for the section of the town to be first sewered.

According to the other plan the septic effluent is to be delivered through the dosing conduit and by means of automatic syphons upon the surface of the primary filter beds. There are to be four of these primary contact beds arranged side by side and four secondary contact filters, each primary bed having its corresponding secondary filter. All of them are to be of equal size, one hundred and five feet long by seventy-one and sixty-six-hundredths feet wide, and have a depth of filtering material averaging three and seventy-five-hundredths feet. After the septic effluent has passed through the primary filter it will pass to the corresponding secondary filter, primary beds, one, two, three and four having their complements in secondary beds five, six, seven and eight in their respective orders. So bed one can deliver its effluent upon bed five only.

The dosing conduit will pass down between the two rows of primary and secondary filters. It is to be built of concrete five feet wide and the flow line it will be elevation four hundred and thirty-six and nine-tenths which is ten inches above the elevation of the flow line in the primary beds. There is to be a twelve inch by-pass from the upper end and a twenty-four inch pipe drain from the lower end of the conduit, fitted with gates by means of which septic effluent may be conducted without filtration to Letort Spring Run.

The distribution system on each primary bed will comprise a main line of pipe with five inch branches laid in parallel lines twelve feet apart, all at a level grade. The top of the twelve inch main to be flush with the top of the filtering material whose surface is to be even with the flow line of sewage. Each filter bed when completed is to have a depth of filtering material of three and five-tenths feet at the shallowest point and four feet at the deepest point all to be clean and free from dust, and may be limestone, granite or trap rock or sandstone. The top layer is to be ten inches deep of stone from one-eighth to one-half inches on longest dimensions, supported by a layer two and twenty-five-hundredths feet in depth comprising stones ranging in size from seventy-five-hundredths to one and five-tenths inches on the longest dimensions, supported by a bottom layer, nine inches to one foot in thickness, composed of stone from two inches to two and five-tenths inches on their longest dimensions.

Each bed is to be enclosed in concrete walls and foundations and on the bottom of each bed is to be a twelve inch underdrain built in a concrete channel longitudinally across the bed in the lowest part and sloping towards the outlet chamber near the corner. Upon the floor of each filter at right angles to the main underdrain and in parallel lines six feet apart four inch horseshoe tile drains are to be laid with open joints. The outer end of each is to be plugged. The upper end of the twelve inch drain is to be connected to a vertical pipe carried up above the surface of the filtering material.

The secondary beds are to be built in substantial accordance with the primary filters. The level of the water surface and the surface of the filtering material is to be four hundred and thirty-one and sixty-five-hundredths, which is four and forty-two-hundredths feet below the surface of the primary beds. Each primary filter bed will be supplied with the Adams Automatic Syphonic Apparatus for regulating and actuating the filter beds. This arrangement is to be built so as to dose and discharge each bed in such cycles as may be desirable.

Each discharge syphon from the primary filter beds is to be connected with a twelve inch cast iron pipe connected to the distribution pipe of the corresponding secondary filter bed. Each such secondary filter bed will be supplied with the Adams Timed Syphon arranged to discharge the full liquid contents of each bed in such cycles as may be desired. The discharge is to be a twelve inch pipe connected to an eighteen inch drain to be built along the lower end of the secondary filter beds.

The automatic devices are to be provided by the contractor and to be installed and operated by him and they must work properly and continuously before the plant will be accepted by the borough according to the terms of the specifications. Any repairs, readjustments or additions necessary to the proper operation of these devices for one year after the completion and acceptance of the plant by the borough must be supplied by and at the expense of the contractor.

The chambers holding the automatic apparatus are to be covered with wood floors, hinged and provided with lock and key.

The elevation of the collecting manhole where the eighteen inch drain connects with the twenty-four inch effluent pipe is four hundred and twenty-five and six-tenths or about three feet lower than water in Letort Spring Run, so this pipe will be extended down the valley and discharged into the run at a point about two thousand feet below the filter beds. If this were not done, the secondary beds could not be drained because their bottom is slightly lower than the reported elevation of the water in the stream opposite the filter.

The petitioners expect to attain ninety per cent. bacterial efficiency by the contact bed system. The cost of installation is estimated at forty-one thousand dollars. The rated capacity is eight hundred and fifty thousand gallons daily which is equivalent to a rate of filtration of six hundred thousand gallons per acre per twenty-four hours.

It is proposed that three of the four series of beds shall be kept in continuous use, the fourth being out of commission to provide rest periods and for cleaning and repairs. The plant will be extended as necessity demands so as to keep the maximum rate of filtration that above mentioned.

Since the State has not issued a general standard of purification to be attained by sewage disposal works for the very good reason among others that no such standard could be successfully established in justice, the petitioners have deemed it best to offer for approval two sets of plans with the request that the cheaper works be sanctioned by the Commissioner of Health.

The vertical height obtainable at the site of the proposed plant is limited. The sprinkling filters, therefore, are reduced in depth to four feet, while good practice seems to require at least a depth of two feet greater than this. Even to get four feet requires the construction of an effluent drain over half a mile long to permit of a gravity discharge into the run. Besides a sprinkling filter accumulates solid matters which adhere to the stones, dry up and eventually peel and drop off or are detached from the stones and are forced to the bottom of the filter and through the underdrainage system out in the effluent. These dislodged matters are unloaded rather irregularly and in quite large quantities. They easily settle and would tend to clog the long flat pipe outlet, make the water in the run objectionable in appearance and give rise to complaints from the owners of pasturage grounds along the stream and rightfully so. Settling basins are usually provided into which sprinkling filter effluents are turned for the purpose of intercepting the suspended solids. There is not vertical height at the proposed works for the installation of settling basins unless the effluent be pumped or the works located on higher ground and all of the sewage be pumped.

Furthermore, advancement in the art of sewage treatment may render economically possible the sterilization of sewage effluent. It is known that cattle may be harmed by sewage polluted water. The concentration of the sewage of a town on one place for treatment directs the attention of the citizens of the country to that particular place and undoubtedly where the effluent goes into a stream from which cattle drink, public sentiment will demand at no great future date that such effluent shall be purified according to the best methods and the highest standards compatible with economy, all of which make it

desirable that the arrangements of the sewage disposal plant to be selected today should be adapted not only to the demands of the present day, but as far as possible, to the probable requirements of the future. The sprinkling filter design would fall short of these requirements as proposed in the plans submitted, and, therefore, should be disapproved.

The contact filter system is better adapted to accomplish more perfect purification of the sewage. The layout is an attempt to obviate pumping of the town's sewage. The outlet drain into the run should be carefully built and the joints made tight, and inspection manholes at frequent intervals along its line should be built for inspection and maintenance operations.

In the future when the interests of the public health demands a higher degree of purification than can be secured by septic tanks and contact beds proposed, it will then be necessary either to extend the effluent outlet down stream for a gravity discharge to the works where final treatment or all the effluent must be pumped. It would be a good plan for the borough to build the septic tank sludge pump well deep enough so that in the future all effluents can be conducted to it for raising to a higher elevation.

There is no necessity for the by-passing of septic liquid or sewage from the septic tank and dosing chambers into the creek. These liquids should be emptied by pipe into the pump well and thence be raised back into the septic tank compartment in use at the time.

The sludge bed should be made water tight, have a filter bottom underdrain, the main underdrain discharging into the said pump well. Such minor changes as may be necessary to obviate the passage of sewage into the run from any part of the proposed works except after the sewage has passed through the septic tank and the filter bed system, should be made.

The success of the operation of the proposed filter beds depends to quite a degree upon the automatic apparatus whose object is to effect the control of the sewage in passing through the various parts of the works without manual manipulation. All mechanism requires watching and occasional repairs. Even if the apparatus be successfully installed, it is liable to get out of order and this would disarrange the entire plant and probably cause a pollution of the run. Controlling devices when installed should be purchased under careful guarantees and they should be set up in a manner admitting of manipulating by hand. It should not be possible for the plant to be put out of commission or for it to be rendered less efficient owing to a temporary removal or entire abandonment of the devices. Best practice dictates that the arrangement provides for both automatic control and hand control.

The petitioners expect as compensation for a right of way through the Carlisle Indian School grounds in which the Federal Government has territory rights to grant permission to said school to connect its outfall sewer with the main borough sewer.

The sewage from the County Insane Asylum and Poor Farm upon whose land the sewage disposal plant is to be erected, now goes into a tributary of the run. It is desirable that this sewage also should be taken into the borough sewage disposal plant as compensation, in part at least, if not in whole for the land to be pre-empted by the borough for its sewage disposal works.

The assessed valuation of the borough is reported to be three million eight hundred and forty-four thousand and eight dollars, and the bonded indebtedness one hundred and one thousand four hundred dollars, which fixes the present borrowing capacity at one hundred and sixty-seven thousand one hundred and eighty dollars, a sum ample enough to provide for the construction of the proposed sewage disposal works, the outfall sewer and the mains and some of the lateral sewers, in fact all of the lateral sewers, provided these be laid by the assessment plan on abutting estates. The project of building a part of the sewers and disposal works first and to make additions thereto as a conservative and desirable one. The installation of a public improvement of this magnitude involving such a large expenditure is one that can be best done by proceeding slowly. The local authorities should be commended for the care thus exercised in the thorough preparation of plans. A sound policy will no doubt characterize the further conduct of the enterprise. The interests of the public health require that the sewers shall be very carefully built according to the plans, and that the entire improvement should be under the responsible direction and supervision of the designing engineer, or one equally skilled in the construction of sewers and disposal works. The sewers must be built with tight joints and if underdrained, there must be absolutely no connection between the sewers and the underdrain. In case leaky sewers discharge their flow into the underdrain system, reconstruction should be required, or the abandonment of the underdrain system made necessary.

Another important matter is the keeping of accurate records of all house connections. In a town these total a greater distance than the street sewers. So if the house connections be poorly built, they may leak and more than double the flow in the street sewers requiring a corresponding increase in expenditures for disposal works and daily operation. Some municipal supervision should be exercised over all connections with the public sewer system.

It has been determined that the interests of the public health demand that a permit be granted and it is hereby and herein granted for the installation

of the proposed system of sanitary sewerage and sewage disposal works comprising septic tanks and contact filter beds under the following conditions and stipulations:

FIRST: That all storm and roof water shall be excluded from the system, and that at the close of each season's work, the borough shall prepare a plan and profile of the sewers laid during the year and file the same, together with such other information in relation thereto, and the number of connections made therewith, as may be required, with the State Department of Health. The special admittance of roof water for flushing purposes, limited to the number of places proposed, is approved.

SECOND: No existing or private sewer shall be considered with the proposed sewer system, unless after rigid inspection, it be found to be tight and in good repair and in other respects desirable as a connection.

THIRD: The local authorities shall cause to be made a monthly inspection of the sewer system and no connection with the sewer shall be made unless a permit therefor be granted by the borough and the connection be constructed under the supervision of a borough official appointed for the purpose and in accordance with the provisions of any ordinances relating to plumbing and sewer connections which the council may adopt, and a record thereof shall be kept and a copy submitted to the State Department of Health when called for.

FOURTH: For the purpose of requiring all estates now sewering either directly or indirectly into any of the waters of the State or into highways, or whose sewage now creates a nuisance, to discontinue such discharge or disposal and to connect with the public sewer, the borough shall provide an ordinance therefor and put it into execution as far as practicable after the sewerage system herein approved is ready for use.

FIFTH: Before the sewer system is used, the sewage disposal works shall be completed and both the sewers and the purification plant shall be put into commission at one and the same time.

SIXTH: The walls of the pump well at the disposal works shall be carried down to a depth sufficient to receive the drainage from the septic tanks, sludge drying beds, dosing chamber and from any and all parts of the disposal works, and arrangement shall be provided so that there shall be no by-passing of sewage into the stream at any time, but when required such by-passing shall be into said pump well from whence the liquid shall be raised into the septic tank or tanks.

SEVENTH: The sludge drying area shall be provided with an underdrainage system with an outlet into the pump well and plans of the same shall be prepared and submitted to the Department for approval.

EIGHTH: The roofing over of the septic tanks should be anticipated. Experience may prove this roofing to be desirable, and the plans should contemplate this expedient.

NINTH: The controlling apparatus is, according to the design, a very important part of the disposal works. Provision shall be made whereby the passage of the sewage through the various filter beds may be controlled by hand conveniently in event of accident or repairs to the automatic mechanism, and because the plant is to be continuously operated, the borough shall employ competent attendants of a class capable of understanding the principals of sewage purification and the responsibilities involved in assuming the duties of care and operation of such a plant.

TENTH: Such reports of the operation of the disposal works shall be made to the Department of Health on blank forms to be furnished by the State, as the Commissioner of Health may require, and if at any time, in the opinion of the Commissioner of Health, the system of sewerage and the sewage disposal works, or any part thereof, is inadequate for or prejudicial to the public health, then such remedial measures shall be adopted as the Department of Health may approve or advise.

ELEVENTH: No pathological material from and laboratory shall be permitted to be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

The borough is advised to adopt a plumbing ordinance for an untrapped house drain from the sewer to the roof of the house or above it, with which all plumbing fixtures connected shall be trapped, and it is especially stipulated that the disposal works and main sewers shall be built under the responsible direction and supervision of the engineer who designed them, or an expert experienced in such matters.

The borough is also advised to cause the abandonment of all dug and drilled wells in the town, and to take into its system the sewage from the Carlisle Indian School and from the County Asylum, if it be found practicable to do so. It is stipulated that the county institution shall have a right, if it choose to use it, to deliver its sewage into the main outfall sewer leading to the borough's purification plant in lieu of other payment to it by the borough of Carlisle for land for the proposed sewage disposal plant.

Harrisburg, Pa., September 10th, 1907.

CARLISLE, CUMBERLAND COUNTY.

This application was made by the borough of Carlisle, Cumberland County, and is for permission to change the line of the outfall of the proposed municipal system and for permission to erect the proposed disposal plant for the treatment of the sewage of said borough on property now or formerly owned by J. Brown Kelley in North Middleton township, said county.

It appears that the petitioners represent that a change in line of the outfall sewer from the plan originally submitted may be desired in order to avoid the Carlisle Indian School property, and permission to do this is asked. Furthermore, it is stated that the disposal plant is to be located on property of J. Brown Kelley in North Middleton township, not on property of the County Institution, as originally represented. And permission to intercept the sewage of these institutions, if the borough should so desire, is requested.

These changes in no way affect the efficiency of the proposed sewerage system.

It has been determined that the interests of the public health demand that a permit be issued and a permit is hereby and herein issued supplementary to the permit issued by the Commissioner of Health to said borough of Carlisle on September tenth, one thousand nine hundred and seven, the said supplementary permit being for the proposed changes in line of the outfall sewer and for the location of the sewage disposal plant on the property of J. Brown Kelley in North Middleton township, under the following conditions and stipulations:

FIRST: That approval of the proposed alterations to the original plan be given and that the borough may adopt and construct either one of the two outfall sewer lines, under all of the conditions and stipulations set forth in a permit dated September tenth, one thousand nine hundred and seven, and issued by the Commissioner of Health to the borough of Carlisle, for permission to construct a system of sewerage and sewage disposal works, with the following exception: "That the clause herein as follows: "It is stipulated that the County Institution shall have a right, if it choose to use it, to deliver its sewage into the main outfall sewer leading to the borough's sewage purification plant, in lieu of other payment to it by the borough of Carlisle for land for the proposed sewage disposal plant," shall not obtain, but is hereby and herein revoked.

SECOND: The said borough may, if it chooses to do so, admit the sanitary sewage of the Carlisle Indian School and the County Institution building to the proposed sewer system and disposal works.

Harrisburg, Pa., November 2nd, 1907.

CHAMBERSBURG, FRANKLIN COUNTY.

This application was made for the borough of Chambersburg, and is for permission to construct a sanitary sewerage system and sewage disposal works and to discharge the effluent therefrom into the Conococheague Creek in Hamilton township.

It appears that Chambersburg is the county seat of Franklin county, has a population of about ten thousand people and is situated in the central part of the county on the lines of the Cumberland Valley Railroad and Western Maryland Railroad, fifty miles south of Harrisburg and fifteen miles north of the Maryland boundary line. It is in the Cumberland Valley, near the summit between the Potomac and Susquehanna River basins, on the east branch of the Conococheague Creek which takes a generally south-westerly course to the Maryland line and drains a beautiful mountainous and agricultural valley.

Besides being the center of a fertile farming district, the town possesses manufactories, among which are the Chambersburg Engineering Company, the Wolf Company and the Wood Manufacturing Company, all makers of machinery or milling supplies, and the Chambersburg Woolen Company.

The Presbyterian Educational Institution for Girls, known as Wilson College, is also located in the borough. It is said to have an enrollment of approximately five hundred students.

The Conococheague Creek passes lengthwise through the western part of Chambersburg. It is the boundary line between Hamilton township on the west and Guildford township on the east. In the extreme north-western part of the borough is Wilson College, the grounds and buildings being partly in the borough and partly in the strip of Guildford township, between the borough and the creek. In this strip also, near the central part of the town, is the Wolf Company's plant, on the banks of the creek just below the dam forming what is locally known as Wolf Lake, which serves as a resort for aquatic pastimes as well as constituting a mill privilege. The part of the stream in the borough is about four thousand feet long and about midway there is a dam and mill privilege in operation. Just below the borough there is a third dam and mill privilege in operation.

The Cumberland Valley Railroad yards, shops and central offices are in the northern part of the town. Immediately south of them is the valley of Falling Spring Creek, coming from the mountains to the east and joining the

Conococheague in the center of the borough above the dam. South of this valley in the central part of the town there is a knoll fifty feet higher than the main stream from which the land slopes in all directions. There is another hill in the western part of the borough of equal height from which the drainage is easterly to the Conococheague.

The Chambersburg Engineering Company's plant is in Guildford township just beyond the extreme southerly boundary of Chambersburg.

The geological formation is limestone. It outcrops at numerous points in the town and nowhere is the rock very far below the surface. It is full of crevices and is extensively used for the reception of water closet and house drainage. Such holes are called cess-pools and are reported to be eight hundred in number in the borough, and approximately thirteen hundred privies are in the same district.

Along the valleys, as a rule, the ground water level is near the surface and many cellars have standing water in them, especially during wet seasons.

The water works are owned by the municipality and furnish water to the borough and to a considerable population outside. The source of supply is the Conococheague Creek from which water is taken at a point two miles above Chambersburg and supplied without filtration to the consumers. The water shed above the pumping station has an area of about one hundred and six square miles, the lower half being farm land of limestone formation and the upper half being wooded, mountainous country or rock porphyry formation, a considerable area being comprised by the State Forestry Reservation. The population on the water shed is over five thousand and there is a colored camp-meeting ground where possibly two thousand people congregate for single days. Many menaces exist on the area contributing to Chambersburg's supply, which the interests of the public health demand should be removed. The citizens of the town are contemplating one or more projects for an additional source of supply of pure and uncontaminated water. Financially, Chambersburg is well off. The borough's valuation is reported to be nearly three million dollars, which would undoubtedly be increased were a new valuation to be put into effect. Provided the present bonded debt is one hundred and twenty thousand dollars, the borrowing capacity of the municipality is limited to the neighborhood of one hundred thousand dollars.

There are no public sewers in the town, but the borough has granted permission for the laying of some sanitary sewers by private parties and such sewers have become semi-public conduits. The borough has built a few drains for storm water.

Below the dam in the borough there are two principal private sewers discharging into the creek. The one immediately below the dam is two feet in diameter at its outlet. It is known as the Shank sewer and was installed under an agreement with the borough signed by W. H. Shank, January seventeenth, nineteen hundred and six. The agreement provided a specific location, substantially in accordance with the lines of a sewerage system laid out for the entire borough. Moreover, the borough reserved the right in the event of the adoption of a general sewerage system, to require the said private pipe line to be abandoned, or to incorporate the pipes as a part of the general system. It was also provided that other owners of property might join their estates to the sewer by paying a pro rata share of the general cost to the constructors and by subscribing to the articles of agreement.

This sewer extends from its outlet below the dam northerly along the west bank of the Conococheague through the property of the Chambersburg Gas Company to Gas Alley. This part is two feet in diameter. Thence easterly along the creek in Gas Alley to Main street, north to the public square and east in Market street to Third. Its total length is about twenty-four hundred feet and beyond the gas works it is ten inches and eight inches in diameter. It receives some roof water; there are about sixteen sanitary connections and the outlet receives drainage from the gas plant. Manholes have been provided at every change in line. Two hundred people are reported to be served by this structure.

The other sewer below the dam serves the western section of the town and is known as the Federal street sewer. Its outlet is ten inches in diameter and the upper part is eight inches in diameter. Oral permission is recorded in minutes of Council, May fifth, nineteen hundred and two. The sewers and its connections comprise a total length of about two thousand feet, and connected therewith are twenty-two estates of which ten connections are merely cellar drains, while the others are for both cellar drainage and sanitary purposes. Probably fifty persons use this sewer. The prevalence of ground water in the district was the immediate reason for installing this sewer.

There are two principal private sewers into the Conococheague in the borough above the dam. They are both on the east bank and the first is in West Market street, extending from the public square westerly three hundred and twenty-five feet to the creek. It was put in during eighteen hundred and ninety-eight under an agreement with the borough whereby it reserved the right, in the event of the adoption of a general system, to take over and use the sewer, or require it to be abandoned. It furnishes sanitary facilities for about fifty persons, and receives some roof and cellar water.

The other private sewer is twenty-four inches in diameter at the outlet, reducing to ten inches at the upper end, affords sanitary facilities for about seventy-five people whose properties are in the central part of the town, and empties into the creek at King street. It was put in by borough sanction during eighteen hundred and ninety-seven.

There are also fifteen other private sewers, each serving from one to six dwellings, or buildings, which empty into the main stream or Falling Spring Creek at conventient points. These sewers probably furnish to possibly five hundred people, so that probably the sewage of nine hundred persons is directly conducted into the water courses in the borough.

The gas works conduct the waste water to a settling tank, where the heavier oil waste and gas tar are collected and finally burned, this by-product being a good substitute for other fuel. Before the separating process was installed, all of the waste went into the Conococheague as may be evidenced by the condition of the banks and bed of the creek for several miles below. Much of the oil waste washed out is of specific gravity, only slightly greater than the water, and while it may settle to the bottom of the tank, the slightest agitation brings it to the surface. The process would be more effectual if improvements and extensions were made to the settling tank and operated continuously.

The Chambersburg Woolen Company's plant discharges spent dye liquors into the Conococheague above the dam in the town. It imparts a very decided dark color to the waters and is principally objectionable on this account.

There are also five slaughter houses in the borough on the banks of the main stream. They discharge their offal and liquid drainage into it to a greater or less extent.

The following petition, signed by fifty-five land owners along Conococheague below Chambersburg, was received in May, nineteen hundred and six:

"To the State Board of Health of the State of Pennsylvania:

"The petition of the undersigned riparian owners and citizens of Franklin county, State of Pennsylvania, respectfully represents that a certain private stream of water known as the East Conococheague Creek in said county and state has been and now is being polluted by the borough and corporation of Chambersburg of said county and state, by sewage and drainage of gashouse, woolen mills and various other sources, substantially destroying the value of riparian rights and a serious menace to health and public welfare

"The undersigned residents of said county and state respectfully ask you to make an inspection with reference to the depositing of such matter into said creek and give them relief as can be had under the existing laws of the State of Pennsylvania in such cases made and provided, and they will ever pray, etc."

On April fifteenth, nineteen hundred and seven, a petition signed by twenty-five residents and property owners in the vicinity of the old brick yard clay pit on King Street was filed with the Department; the following is a copy:

"Chambersburg, Penna., April 15.

"Hon. Samuel G. Dixon,
"State Health Commissioner,
"Harrisburg, Penna.

"Dear Sir:—

"A situation exists in one of the resident sections of the borough of Chambersburg, which is a serious menace to the public health. Sewerage and surface water is permitted to be collected in certain ponds along King street and within three minutes walk of the Cumberland Valley station. No outlet is provided for it, and all the other accumulated filth simply remains there for half the summer, becomes a prolific producer of innumerable disease germs, a stench to the nostrils of all who have residence in the community or who are compelled to pass along the busy streets in proximity to this locality. It is a blotch to the appearance of our populace and thrifty borough and is the breeding spot for millions of mosquitoes all during the heated term.

"At different times the attention of the council as well as the local Board of Health has been directed to this nuisance but no steps have been taken to alleviate the objectionableness of this condition, therefore, we the undersigned residents and property owners in this locality appeal to you and ask that you take steps to investigate the situation above referred to and to promptly have such action instituted as will result in its correction.

"In requesting you to intercede in our behalf we stand upon our rights as citizens of this Commonwealth, believing that whenever the local authorities fail to properly protect the public health, that it then becomes the duty of the Commonwealth, through its Health Department, to afford to the citizens of the State the protection for which we pray."

The revised plan as finally submitted and now under consideration comprises a system of sanitary sewers for the entire municipal territory, and for such territory adjacent thereto naturally draining through the present borough territory as will in all probability soon be annexed.

The sizes range in diameter from eight to twenty-four inches, and the total length about twenty miles, of which two thousand feet are to be twenty-four

inches in diameter, nine hundred feet twenty-one inches in diameter, twelve hundred and fifty feet twenty inches in diameter, seven thousand two hundred and fifty feet fifteen inches in diameter, one thousand one hundred and twenty-five feet twelve inches in diameter, six thousand two hundred and fifty feet ten inches in diameter and eighty-six thousand six hundred feet eight inches in diameter.

In general, the sewer grades and district systems will conform to the topography of the ground. With the exception of the main sewer, the grades will be almost exclusively in excess of four per cent. The sewers are to be flushed by means of automatic tanks, one to be located at each end in the system.

Under-drainage is to be provided wherever house cellars are wet and demand relief. Because of rock excavation in which most all of the pipes will be laid, the depths of sewers will not generally be carried much below that demanded by existing cellars. Since the sewage is to be treated, the plan contemplates the exclusion of all roof and cellar and street water.

The underdrains where required, (this to be ascertained at the time of construction for lateral street) are to be laid underneath the sanitary sewers, and if the details submitted be followed, there will be three inches only between the bottom of the sanitary sewer and the top of the underdrain beneath it, or to one side of the same trench. Extreme precaution is to be taken in the construction of both the underdrain and the sewer, because unless careful work be done the sewer would settle and sewage seep out into the trench and eventually into the underdrain system and through said system into the natural water courses.

According to the plan the main underdrain of the system east of the creek is to be twenty-seven inches in diameter, to start in King street at the swamp and the stagnant ponds there and the sump in said street between Fifth avenue and Fourth streets and thence to follow the line of the main sewer for this district westerly and discharge into the creek at the foot of King street, this underdrain to serve also as a storm conduit for the removal of surface water from the low point in the street. There was formerly a natural water course extending northerly through this swampy tract into Falling Spring Run. Its course has been obliterated by the excavation made there in quest for clay for the manufacture of brick.

Undoubtedly there is some public responsibility for permitting the existing nuisance, and while private interests will be materially benefitted by the drainage of this swamp, the interests of the public health will be sufficiently subserved to warrant the expenditure of public moneys called for by the proposed plan in the opinion of the petitioners. Whether or not assessments on private properties for betterments should be made has been considered but definite conclusions have not been reached at this time.

The second underdrain outlet is to be into the creek at Gas alley. This is as far as details have been decided relative to underdrains.

The main sewer outlet is to be twenty-four inches in diameter and its elevation is determined by the requirements of the sewage purification plant. Beginning below the borough in Hamilton township on the north side of the creek and just above the dam, the main sewer is to pass up the valley of the creek partly in private territory and partly in public ways to Gas alley and thence in Gas alley and across the creek suspended on the bridge to the east part and principal portion of Chambersburg. At the outlet there are fifteen hundred and forty-three acres contributing to the system comprising the areas both within and without the borough, the area within the borough being seven hundred and sixty-eight acres and the remainder being that which the municipal authorities deem it advisable to include in the plan, but lying for the present outside of the municipal territory.

At Gas alley bridge the sewer is to be fifteen inches in diameter and the total area tributary is eight hundred and four acres, all of which will be served by a gravity system with the exception of a total of one hundred and forty-eight acres in the valley of the Conococheague Creek in the north part of the borough comprising the territory on which Wilson College is located and considerable of Philadelphia avenue, together with the fifty-two acres outside of the borough's present limits in the lowlands near Wolf Lake and thirty-three acres on higher ground north of the college, the sewage from which will require to be pumped. The plan provides for the collection of this sewage in a pump well at Chambers street and Wolf avenue, from whence it is to be raised by centrifugal pumps, electrically driven and automatically operated a short distance in said Chambers street to the gravity system. The lift will be about thirty feet. No details of this pumping station layout have yet been submitted.

The southern portion of the borough and that territory outside of the municipality, known as Brandon and likely soon to be annexed to the borough, are to comprise a distinct sewer district, main intercepter of which is to connect with the outfall sewer at a point two thousand feet above the sewage purification works. It is to be fifteen inches in diameter and is to be carried over the creek by a bridge especially constructed for the purpose. At this point of intersection the main sewer will be twenty-four inches in diameter and above it twenty-one inches in diameter.

An intervening territory of thirty-eight acres east of the creek and adjacent to it is too low to be served by the other district intercepters, and therefore, is to have its own outlet which is to be an eight inch pipe and to be carried across the creek on the existing Louden street bridge to the main outfall sewer.

The main outfall sewer from the sewage disposal plant is to have the minimum grade of fourteen-hundredths per cent. This is sufficient to insure a self cleansing velocity. The elevation of this structure for its entire length will be above the freshet flow of the creek. Into it the district sewers to serve West Chambersburg will be connected at convenient points. The entire system has been carefully worked out from recent surveys made for the purpose, and it is evident that the sewage from ten per cent. of the territory must be pumped because it lies too low for a gravity discharge into the sewage purification plant. It is of course good design to obviate pumping as much as possible, and this is provided for in the proposed plans.

The site of the proposed sewage purification plant was formerly a brick yard. Within six hundred feet there is a grist mill at the dam and a residence. The general locality is secluded. The precise place where the works are to be built has not been determined, but the petitioners state that a distance of one-quarter of a mile from the public highway can be obtained. Somewhere in this vicinity it is proposed to install near the banks of the creek and above average flood heights for all of the plant and above extreme flood heights for a part of the plant, open septic tanks and settling basins, and double contact filters. A general plan of the works has been submitted which shows sufficiently in detail the layout to warrant the conclusion that it is practicable to construct a sewage purification plant in the vertical height between elevation five hundred and eighty-eight and five-tenths which is the end of the outfall sewer and elevation five hundred and eighty which is the average flood height, most of the time the height of the water in the creek being the mean elevation of five hundred and seventy-six. There are to be four open septic tanks and two settling tanks built of concrete, the top of the walls being six feet above extreme flood.

The septic tanks are to be arranged side by side each sixty-five feet long by nineteen feet wide and six feet deep from the flow line. The sewage is to be delivered from the main outfall sewer into a feed channel extending along the inlet ends of all four tanks and from it to any or all of the septic tanks by means of two openings below the flow line on each tank, fitted with sheargates.

Extending across the inlet end and the outlet end and mid-length of each tank are to be baffle boards suspended from the surface to mid-depth of the sewage to serve as an equalizer of the currents. These boards are to be made in such a manner that their position in the tanks may be changed at will.

The outlet from each tank is a six foot weir in the end wall at the center opposite the inlet end of the tank, over which weir the effluent is to flow into a collecting trough extending across the entire length of the ends of the four septic tanks, and built in the wall in the top thereof.

Underneath this trough in the wall is to be an open space or conduit extending down below the bottom of the septic tank, to serve for the drainage of the septic tanks and any accumulations therein and also for the drainage of the settling basins which are to be arranged on the opposite side of the wall from the septic tanks. This drainage conduit is to connect with a pipe leading to the sludge drying area.

Whenever it becomes necessary to drain the septic tank or settling basins, the discharge will be upon a strainer twenty-five feet wide and fifty feet long, having three feet in depth of broken rock underdrained with six inch tile placed four feet on centres in parallel rows and terminating in a sump well. The sludge and liquid from the tanks will flow by gravity to the strainer, the liquid will pass to a pump sump (because the bottom and sides of the strainer will be constructed of concrete and made water tight) from which sump the effluent will be pumped back into the feed channel of the septic tank by means of a centrifugal pumping plant provided for the purpose. The sludge will dry out on the strainer and be removed and disposed of in some sanitary manner.

From the septic tanks the partially hydrolysed sewage with the finer suspended particles will pass into the settling tanks which are provided for further hydrolytic action of the matters in suspension and for symbiotic action between facultative anaerobic and aerobic organisms.

Each settling basin is to be thirty-nine and five-tenths feet long and twenty-three feet wide and four and five-tenths feet deep to flow line the two divided by a wall containing a trough at the top connecting to the effluent trough of the septic tank, both provided with weirs so placed in the sides of the troughs, and by sluice gates, that the septic tank effluent may be directed to either one or both of the settling basins or directly from the septic tanks to the primary contact beds. Each basin has a longitudinal division wall extending nearly the whole length thereof which assures at least an eighty foot course in passage of the liquid through each basin.

The nominal capacity of the plant is six hundred thousand gallons daily and when extensions to the tanks become necessary, they may be made on either side advantageously. At the normal rate of flow the plans contemplate about an eight hour displacement in the septic tank and a displacement in about one-third of this time in the settling basins, when all are used simultaneously.

The primary contact beds are arranged within a circle into six equal sectors, the surface area of each being thirty-three hundred and sixty-four square feet and having an elevation of five hundred and eighty-six. There is to be three feet of filtering material, the top layer of three inches being fine, the next six inches being crushed rock from one to one and a half inches in diameter and the remaining two and a half feet to be crushed rock two inches in diameter, all resting on a concrete floor upon which is to be placed six inch semi-circular tiles not over three and a half feet on centers at the outer circumference of each bed and radiating to the center of the circle where is to be located the building for housing the automatic apparatus for the distribution of the sewage and collection of the effluent. The object of this apparatus is to assure the distribution of the sewage in even doses mechanically, but the control may be effected by hand also.

The plant is to be operated continuously so that the filters must receive the flow at a rate it is discharged by the sewer system from the town. The intention of the design is to dose each of the six filter compartments in rotation with equal doses of about twenty-five thousand gallons so that each primary bed would receive four doses in twenty-four hours when the flow averages six hundred thousand gallons daily which is equivalent to a rate of filtration slightly in excess of one million gallons per twenty-four hours.

The automatic airlock sluiceways will distribute the sewage onto the surface of each compartment and when the bed is filled to the predetermined depth equivalent to a dose of twenty-five thousand gallons, automatically shut off the flow and turn the sewage on to the next compartment and so on completing the cycle of the six primary filter beds grouped around the controlling chambers and apparatus. At the same time the mechanism will hold the sewage in contact in the bed a predetermined length of time and then release it, permitting a sufficient period for drainage and aeration before the next dose in that particular compartment, which will be at about six hours' intervals.

The released effluent will flow by gravity to the secondary contact beds. Each one of the six primary contact beds is to be connected by an independent pipe with its corresponding secondary contact bed. These are to be rectangular in shape, each one hundred feet long by thirty-three and a half feet wide, arranged side by side in concrete water tight structures whose outside walls are to be carried up to elevation five hundred and eighty-four or one foot above extreme flood height. The surface of the bedding material therein is to be at five hundred and eighty-three. The first three inches of material at the surface is to be fine stuff, the next six inches crushed rock between one and one and a half in diameter and the remainder two inches in diameter all placed over six inch tile drainage laid in paralled rows three and a half feet on centers and discharging into a main collecting pipe emptying into chambers discharging into a twelve inch pipe terminating in the outlet chamber from which the main drain to the creek is to extend. The pipe is to be twenty-four inches in diameter and its bottom is to be at elevation five hundred and eighty at the outlet chamber which elevation is that of the average flood height. The airlock apparatus will also control the operation of the secondary filter. It is expected that the effluent from the plant will be of sufficient purity to be discharged into the stream.

It is anticipated that the town sewers will be generally availed of on completion of the system. Unless extreme care be exercised in the construction of the sewers and the underdrains before a single dwelling be connected with the sewers, it would be possible for the infiltration of the ground water to amount to a flow in the sewers equivalent to the nominal capacity of the proposed sewage disposal plant. Should such a thing happen, a very large expense would be immediately imposed upon the borough for the construction of a large sewage disposal plant to treat the seepage water and the house sewage besides. The emphasis of this point should at once make clear to the local authorities the value and necessity of competent and faithful engineering service in the construction of the proposed system. The underdrainage system is designed to obviate excessive cost for sewage purification, and underdrainage has been successfully used in the Eastern States for similar reasons, but the benefits have not been obtained when the penny-wise and pound foolish policy has prevailed of attempting to economize by dispensing with necessary inspecting and engineering service.

It appears that the amount of trade wastes in the borough are small so there is nothing in them when mixed with domestic sewage, of the volume expected, to be detrimental to the biological processes of sewage purification provided for at the disposal works. It is reported that the dye liquors from the woolen mills amount to forty-five hundred gallons daily. The woolen mills are located too low to secure a gravity outlet into the sewer system. Pumping must be resorted to. The dye waters should receive a preliminary treatment by being passed through a filter of clinkers and ashes and then be retained for a few hours in a settling basin before being pumped into the sewer system. The local authorities should provide that this be done.

The sewer system is well designed and comprehensive and adapted to the present and prospective needs of the borough. The ventilation of the system best adapted to separate sewers is available because the system is to be a new one. The connection between the street sewer and the house should be un-

trapped and the main soil pipe should be carried up above the roof of the building thus affording a free circulation of air from the sewer to above the house top. In this way every house connection become a ventilator and assures most perfect conditions of ventilation in the underground system. This method is in vogue in a large number of modern municipalities and gives ideal satisfaction. It requires a borough ordinance and faithful enforcement of its provisions.

The successful operation of the sewage disposal works is a matter largely dependant upon the watchfulness and efficiency of the caretaker. The best designed plant will prove a failure if neglected. An open septic tank might prove objectionable if within less than one thousand feet of dwellings, and the proposed tanks should be so constructed in anticipation of roofing if such should appear desirable or be ordered by the State in the future.

No existing sewer should be incorporated into the new system unless all roof, storm and ground water be excluded therefrom, and the structure after rigid examination be found to be intact and in good state of preservation. The most satisfactory plan in the end to all concerned will be to provide an entire new sewer and house connection for every building.

The borough officials should take action necessary to cause a discontinuance of all existing sewers either public or private now discharging into any run, stream or body of water in the borough as soon as the new system is ready for operation and sewerage facilities are afforded thereby to those estates from which sewage is now discharged either directly or indirectly into the waters of the State. Furthermore, the borough should compel a very general connection of occupied estates with the new sewer system.

The slaughter house and gas refuse nuisance will receive the early consideration asked for and remedies will be afforded by the owners under State supervision. The proposed remedy for the drainage of the brick yard swamp abutting King street is favorably commended as an expedient but it appears that the relief afforded by this measure will be partial only and that the lowland will continue to be the subject to flood at high water. The project of lowering the channel of Falling Spring Run as the complete remedy for proper drainage of this territory is called to the attention of the local authorities. Generally it is better policy to deliver surface water to the nearest natural water course. If the proposed storm drain under the sewer be built great care must be exercised in its construction to assure the maintenance of the integrity of the sanitary sewer to be laid above the drain in the same trench. In case the sewer leaked into the drain below, and in event these leaks could not be stopped, then the entire underdrain would have to be put out of commission. However, it is possible for both structures to be built in a substantial manner. Details should be submitted to the State and be approved by the Commissioner of Health before the underdrain and sewer is built.

In a permit issued by the Commissioner of Health on June twenty-fourth, nineteen hundred and seven, to the borough of Chambersburg to increase its source of supply to the public and to extend and improve its water works system, in response to an application duly made by said borough and bearing date of February nineteenth, nineteen hundred and seven, one of the stipulations required that, "on or before September first, nineteen hundred and seven, the borough shall submit plans and specifications for a plant to treat the Conocoheague Creek water to render it safe for drinking purposes, all plans and specifications for the obtaining at once of a source of supply not prejudicial to the public health, and meantime, the proper local authorities shall notify the public to boil all water used for drinking or culinary purposes. People should be warned of the danger respecting the use of the Conococheague water in its raw condition. If the warning be not heeded, then in the event of an epidemic of a water borne disease, the responsibility will rest on other shoulders than those of the public officials."

It is certain that the interests of all concerned call for the immediate installation of a public sewerage system in the borough and since the municipal borrowing capacity is not greatly in excess of one hundred thousand dollars it is not possible for the town to provide for the filtration of the creek water for a public supply, and also for the public sewer system, unless much of the cost of the latter be paid for by some other method than that of general taxation. It appears that council voted to install a sewerage system on the foot front plan of payment. This assessment scheme is general in use throughout the country and there are other methods of equitably apportioning the benefits of sewerage on abutting estates and upon owners of property connected with the sewer system. It should be possible for the local authorities to devise some system of revenue whereby both water and sewerage improvements may be carried out within the constitutional limit of municipal indebtedness.

The State Department of Health is now engaged in making a sanitary survey of the water-shed affording the source of supply to the inhabitants of Chambersburg, with a view of removing existing menaces to the purity of said supply. In turn the borough shall not be permitted to defile the creek by its own sewage.

It has been determined that the interest of the public health demand that a permit be issued and it is hereby and herein issued to the borough of Chambersburg for the installation of the proposed system of sanitary sewerage and sewage disposal works under the following conditions and stipulations:

FIRST: That all storm and roof water shall be excluded from the system and that no existing public or private sewer shall be connected or permitted to connect with the proposed sewer system unless after rigid inspection such sewer be found to be tight and in good repair and that no roof, street or cellar or other water, except sewage proper be discharged into such sewer. And further, that at the close of each season's work, the borough shall prepare a plan and profile of the sewers laid during the year and file the same, together with such other information in relation thereto as may be required, with the State Department of Health.

SECOND: The local authorities shall make or cause to be made monthly inspections of the sewer system and a record shall be kept thereof and a copy submitted to the State Department of Health whenever called for.

THIRD: Before the construction of any sewer in which an underdrain is to be laid in the same trench, detail plans thereof showing the method of construction to be followed in that particular case as a type of construction to be subsequently followed in underdraining sewers shall be submitted to the Commissioner of Health for approval. The sewer joints shall be cemented and made tight, extra care shall be taken at manholes to prevent infiltration, and because a water tight sewer system is almost vital to the success of the entire improvement, it is stipulated that the sewer system and the disposal works shall be constructed under the direction and supervision and responsible charge of the experts who have planned the works or by others equally competent to execute the design. Details of the underdrain outlets shall be prepared and submitted to the Commissioner of Health for approval before the same are constructed. Roof water and street drainage except in special cases to be mentioned when details of underdrainage are submitted for approval, shall be excluded from the underdrainage.

FOURTH: The borough council shall provide by ordinance for the appointment of an officer to superintend the sewerage system and for the exclusion of roof and street drainage from the underdrain, except as hereinbefore provided, and for the building of all house connections with the sewer system only under permit issued by the borough and under the supervision of the officer whom the borough shall nominate to have charge of the sewerage system. It is as essential that the house connections should be built water tight as it is that the common sewers should be water tight.

FIFTH: For the purpose of requiring all estates now sewering into any stream or body of water to discontinue such discharge and to connect with the public sewer, the borough shall provide an ordinance therefor and put it into execution as soon as practicable after the sewerage system herein approved is ready for use.

SIXTH: Before the pumping system be installed plans thereof shall be prepared and submitted to the State Department of Health for approval.

SEVENTH: Before the sewer system is used the sewage disposal works shall be completed and both the sewers and the purification plant shall be put into commission at one and the same time. While general approval is hereby given to the general plan of the sewage works, the more full and detail plans of said works and the particular site thereof shall be submitted to the Department for approval before the said works are constructed. In the layout, the possibility of the advancement in the art of sewage purification rendering feasible the sterilization of sewage effluents at a reasonable cost, shall be contemplated and if possible the works be so arranged to admit of an economical installation of this finishing process if such be required in the future.

EIGHTH: Such reports of the operation of the disposal works shall be made to the Department of Health on blank forms to be furnished by the State, as the Commissioner of Health may require, and if at any time in the opinion of the State Commissioner of Health the system of sewerage and sewage disposal works, or any part thereof, is not properly perfoming its functions, or is inadequate or prejudicial to the public health, then such remedial measures shall be adopted as the Department of Health may approve or advise.

NINTH: No pathological material from any laboratory shall be permitted to be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

The borough is advised to adopt a plumbing ordinance and to carry out the general suggestions herein made about dye liquors and also to cause the abandonment of all dug and drilled wells in the borough. Especial attention is called to the need of high class work at the disposal plant.

Harrisburg, Pa., September 6th, 1907.

CHARTIERS TOWNSHIP, ALLEGHENY COUNTY.

This application was made by the Commissioners of Chartiers township, Allegheny county and is for permission to build sewers in a portion of the township and to discharge the sewage therefrom, untreated, into Chartiers Creek with said township limits.

Chartiers township comes under the provisions of law governing first-class townships. It is located south of the Ohio River about opposite Allegheny City and is bounded on the north and the west by Chartiers Creek and on the south and east by Greentree borough and also on the east by that portion of the city

of Pittsburg south of the Ohio River. On account of the boroughs which have been formed out of the township, its territory is very irregular in shape and some parts are completely isolated from the others.

Sheridan borough is in the northern part of the township and Crafton borough lies wholly in the township in the southern part. So does Ingram borough, the southern boundary line of it being the northern boundary line of Crafton.

Chartiers township consists mostly of farming land except in the immediate vicinity of some of the boroughs where the built up district extends out into the township. The general topograph is such that further changes in municipal boundaries will naturally result if property developments continue.

The district for which the pending application is made consists of a tract of land lying north and west of and adjacent to the borough of Ingram. Its slopes are steep and drain to a run extending north-westerly through the tract to Chartiers Creek. Here the Otis B. Lane Building Company has laid out and paved two streets and constructed concrete sidewalks and erected seventy-five houses.

The nearest railroad station is at Ingram on the Pittsburg Division of the Pittsburg, Cincinnati, Chicago and St. Louis Railroad. This station is about four and a half miles west of Pittsburg. Ingram is also reached by trolley.

The present population in the district proposed to be sewered is reported to be about sixty-five. The houses already built will accommodate three hundred, and it is expected that the population will be doubled in the future.

There are no industries in the district, so that the future growth, so far as now can be anticipated will be that due to the general growth of the neighborhood and the borough of Ingram.

The water supply is furnished principally by the South Pittsburg Water Company and consists of filtered water originally taken from the Monongahela River.

It is reported that there are no springs or wells in the district and no sewers except those for which application is pending. Cess-pools are in use at some of the older houses.

It appears that on June eighteenth, nineteen hundred and six, the Board of Township Commissioners authorized and approved by ordinance duly enacted a system of sewerage and drainage for a certain part of Chartiers township and under authority of act one hundred and ninety-five of nineteen hundred and one, on the sixteenth day of July, nineteen hundred and six, entered into contract with the Otis B. Lane Building Company, a corporation existing by and created under the laws of the Commonwealth, under the terms of which the said system was to be constructed by said corporation, becoming thereby entitled to exercise all the powers of the township in the construction, maintenance and operation of the system, with the right to collect, assess and make the following charges upon the property of any individual or corporation, who or which, shall or may, at any time connect with said system, as follows: For each connection the sum of five dollars together with the sum of three dollars and twenty-five cents per foot for each lineal foot of property owned by said individual or corporation and abutting upon the line of the improvement and connected with the system. However, the Commissioners reserve to the township the right at any time, after thirty days notice of its intention so to do, to itself take possession of such sewerage system upon terms fixed in the contract.

On the day of the Department's inspection, July second nineteen hundred and seven, the sewers had been practically completed comprising seven hundred and ninety feet of twelve inch pipe in Linwood avenue, about seven hundred feet of twelve inch pipe in the alley between said avenue and Ridge avenue and twenty-one hundred and forty feet of fifteen inch pipe in Broadhead Fording Road leading south-westerly from these avenues to Chartiers Creek. Owing to the topography the sewerage district cannot be increased. It is the intention to exclude storm water and to receive house sewage only. A limited amount of roof water will be admitted for flushing purposes. Surface drainage can be efficiently provided for in the street gutters. No inspection manholes have been provided. The outlet is into the creek just below the mouth of Ingram Run. Some unauthorized connections have been made to the sewers and on the day of inspection above mentioned the small amount of sewage was being discharged into a pool in the creek at the upper end of rapids. The velocity in the pool was considerable, although the stage of the creek appeared to be near the extreme low level. It is for permission to use these sewers that application is made.

Chartiers Creek rises in South Franklin township, Washington county, and flows in a generally north-easterly direction about forty-eight miles, measured along the stream, to its junction with the Ohio River, which it enters at the borough of McKees Rocks and Sheridan and a part of the city of Pittsburg. The area so drained comprises about three hundred and six square miles of which about three hundred are above the proposed sewer outlet at Ingram Run. The creek evidently receives considerable mine drainage as evidenced by the characteristic color of such waters. There are known to be sixty-five coal mines on the water-shed. It is also reported and the inspection supports the contention that fish do not live in the lower waters of the creek.

For about a half mile above the proposed outlet and for about one mile below there appeared to be no sources of sewage pollution except ordinary agricultural drainage, and from information at hand it would seem that the same condition obtains until the borough of McKees Rocks and Sheridan are reached. However, untreated sewage from the boroughs of Ingram, population eighteen hundred, Crafton, population five thousand, Carnegie, population ten thousand, Bridgeville, population twenty-two hundred and Canonsburg, population three thousand five hundred, these populations being estimated, is now being discharged into the creek all within twenty-two miles. The borough of Washington ten miles or so above Canonsburg is now erecting disposal works for the treatment of its sewage.

The petitioners represent that since the sewage from the various municipalities above mentioned is discharged into the creek and since into the stream is also emptied the sulphur water from numerous coal mines located on the banks thereof in Allegheny and Washington counties, the granting of the permit in the present case will not in any wise further deterioate the quality of the waters of Chartiers Creek.

It is possible to erect a sewage disposal plant on one of the several available sites for the treatment of the sewage from the proposed system. The township is reported to have an assessed valuation of four and a half millions and to be free from indebtedness in excess of thirty thousand dollars, which, if true, reveals the fact that lack of financial ability cannot be urged as a reason for the postponement of sewage purification works.

While it is the policy of the State to gradually bring about the discontinuance of the sewage pollution of streams, it is not the purpose of the State authorities to administer the law in a manner inconsistent with the demands of justice to all concerned. Undoubtedly the health and comfort of the inhabitants of Chartiers township will be promoted by the proposed sewer system and without any measurable increase of the nuisance which exists along certain portions of Chartiers Creek by reason of the discharge of sewage therein. Nevertheless, ultimately all sewage must be treated before being emptied into the creek and the various municipalities in the valley should contemplate such treatment in the plans to be adopted in the interim. The sewers proposed eliminate storm water and may be as economically and efficiently incorporated into the plan for treatment of the sewage, in the future, as now.

It has been unanimously agreed that a permit be granted and such permit is hereby and herein granted for the installation of the proposed sewerage system under the following conditions and stipulations:

FIRST: The storm water shall be excluded from the system but a limited amount of roof water may be admitted for purposes of flushing, but under condition that if when treatment works are provided, it becomes necessary to eliminate this roof water, then the said water shall be cut out of the sewer system and otherwise disposed of.

SECOND: This permit to discharge sewage into the waters of the State shall cease on the first day of July, nineteen hundred and ten. But if at that time the interests of the public health demand it, in the opinion of the Commissioner of Health, then the time may be extended in which such sewage may continue to discharge into the waters of the State.

THIRD: If the Governor, Attorney General and Commissioner of Health deem it advisable and therefore require the submission to the Commissioner of Health of plans for the purification of the sewage for any municipality in the valley of Chartiers Creek on or before July first, nineteen hundred and ten, then on request by the Commissioner of Health, the Commissioner of Chartiers township shall prepare or cause to be prepared plans for the treatment of the sewage discharged from the sewer herein approved and submit the same to the Commissioner of Health for approval.

FOURTH: No pathological material from any laboratory shall be discharged into the said sewer system, the proper authorities shall cause these wastes to be destroyed on the premises.

FIFTH: If any lateral extensions to the sewers herein approved be made, plans thereof and any other information desired in relation thereto, shall be filed in the State Department of Health.

SIXTH: The township commissioners shall, within three months from the date of this permit, prepare and file with the commissioner of Health a plan of the township showing the location and sizes and grades of all public sewers in the township, together with a satisfactory report in relation thereto, in conformity with the requirements of act one hundred and eighty-two approved April twenty second, nineteen hundred and five.

The Board of Township Commissioners are advised to construct inspection manholes on the line of the sewers at all changes in grade, at street intersections and at changes in direction of line.

Harrisburg, Penna., November 23, 1907.

CHARTIERS TOWNSHIP, ALLEGHENY COUNTY.

This application was made by the Commissioners of Chartiers township, Allegheny county and is for permission to install a sewer system in what is known as Sewer District A of the township and for permission to discharge the sewage therefrom into Chartiers Creek.

It appears that Chartiers twonship is located in the valley of Chartiers Creek, a stream rising in Washington county and flowing generally northerly to the Ohio River which it enters opposite Allegheny City and between the fortieth and forty-third wards of Pittsburgh, south side, (formerly Esplen and Sheraden boroughs) on the east, and the borough of McKees Rocks on the west. The township borders the eastern bank of the creek, entirely surrounds the borough of Crafton and also nearly encompasses the fortieth and forty-thrid wards of Pittsburgh. On account of the boroughs formed out of it, the present township area is very irregularly shaped and some parts are isolated from the rest. The topography is generally rugged, and the greater part except in the vicinity of the borough, consists mostly of farm lands.

The district from which the pending application is made consists of a small tract of land situated about seven and five-tenths miles above the mouth of the creek. It is in the extreme southern part of the township and is bounded on the west by Robinson township, the creek separating the two, on the north-east by the Chartiers cemetery and on the south-east by Greentree borough and on the south by Scott township. The borough of Carnegie is almost immediately south and borders the creek.

The district is situated in sort of amphitheatre formed by the hillsides. The portion adjacent to the creek is flat and the ground is low and liable to inundation in places. The grades become steeper away from the creek and the eastern portion of the district is on the hillside with fairly steep slopes. Two runs flow through the tract, one in the northern and the other in the southern part, both emptying into the creek. The northerly of these two runs is enclosed in a twenty-four inch pipe for a portion of its length. These natural water courses afford facilities for disposal of the rain water of the district.

Streets and alleys have been laid out paralleling and at right angles to the creek, frame houses of moderate cost have been erected and occupy perhaps one-third of the available territory. The resident population is estimated to be about five hundred. The inhabitants find employment in the industries of the neighborhood. Within the village the laundry is located and employs about twenty hands and the Damascus Tool Steel Company at present employs about thirty hands. Across the creek in Robinson township are the plants of the McClintic-Marshall Company, employing about three hundred hands, and the Columbia Steel Shafting Company, employing about eighty hands.

The water supply is furnished by the South Pittsburgh Water Company and is reported to consist of filtered water from the Monongahela River. There are private wells in use in the district, and drinking water at the industrial plants is quite universally obtained from springs or wells. It is stated that these wells furnish water of good quality and that no sickness has ever been attributed to this source.

There are no public sewers in the district. The streets are unimproved and rain water flows off in the gutters to the runs above mentioned. From observations made during and after heavy rainfalls, it has been concluded that with the possible exception of the small area of lowland near the creek that storm drains are unnecessary for the village.

The laundry has a private sewer to the creek, the Steel Company maintains an overhanging privy on the bank of the stream and the plants in Robinson township also have sewers discharging therein. There are reported to be about twelve cess-pools in use for the disposal of household waste. Most of the inhabitants throw slops and wash water upon the surface of the ground, or have pipes leading to street gutters. During warm weather the conditions are unsatisfactory and a sewer system is desired.

The proposed sewers consist of about seventy-seven hundred feet of pipe ranging in diameter from twelve inch to thirty inch and are to discharge both sewage and storm water into Chartiers Creek at three outlets. The plans submitted show no manholes but several flush tanks are indicated. The Kirkwood avenue sewer is to be thirty inches in diameter and is to terminate at the creek bank at the foot of said avenue. The next outlet down stream is to be at the foot of Elm alley. It is to be a twelve inch pipe. The third outlet is to be at the foot of Locust alley. The pipe is to be twenty inches in diameter.

Other township sewers are contemplated in the district known as the "Park Plan" and also in the "Lenox Plan." Plans however, have not been submitted for these sewers.

The creek at the proposed sewers outlets shows the characteristic color of waters into which mine drainage have been discharged. There are said to be sixty-five coal mines within the drainage area. It is reported that fish cannot live in the lower creek waters, and the acidity thereof prevents the stream being used for manufacturing purposes.

Carnegie, Bridgeville, Cannonsburg and Washington boroughs now discharge sewage into the creek. The latter place is near the head waters, above present mine operations, and the borough is engaged in the erection of sewage disposal works to preserve the purity of the upper waters of the stream. In the lower stretches of the valley, if means be not provided to stop increased sewage pollution there, it is only a matter of time when the creek would become a nuisance and a menace to public health all along its course. Formerly there was no practicable method of treating sewage to obviate the creation of nuisances in nautral water coures into which sewage was being discharged, but not advancements in the art bring the benefits of sewage disposal works within the

bounds of almost all municipalities, and the interests of public health demand that sewer extensions shall be made in contemplation of the ultimate discontinuance of the discharge of sewage into the waters of the State.

Crafton borough and Ingram, which are below the village under discussion, discharge their sewage into the creek. Undoubtedly the small amount of sewage from the proposed sewers would not measurably increase the contamination of the creek at present. It appears unnecessary to make provisions for conveyance of rainwater underground from most of the district under consideration. For reasons of economy and also for considerations affecting the possible construction of a disposal plant, it would be most advisable for the township to construct a system of sanitary sewers with the possible provision for sewering portions of adjacent boroughs which naturally drain into and are comprised topographically in the district, and to construct short lines of storm drains independent of the sewers for such part of the low land near the creek as may need artificial drainage.

The nearest place on the Ohio River below where water is used for drinking purposes is at Coraopolis. The intake is about eighteen miles by the stream, below the proposed village outlets.

Apart from the question of nuisance prevention in the creek, the health of the people in Coraopolis and other towns further down the Ohio River demands a change and improvement in methods of sewage disposal in Chartiers Creek valley.

Because the construction of sewers in the village would abate certain street gutter nuisances, and because it seems likely that the continued use of cesspools and outside privies is likely to cause pollution of the few wells which are at present in use, and because many months will be required in bringing about a change in disposal methods in the municipalities, the circumstances suggest approval of plans for sanitary sewers with right to temporarily discharge into the creek.

If, as reported, the township valuation is about four million five hundred thousand dollars and the total indebtedness not over eighty thousand dollars, the financial ability of the township to undertake the purification of the sewage is beyond question. Owing to the proximity of Carnegie, parts of Greentree borough, Idlewood village and Crafton borough, whose sewage disposal problem might be best solved by a joint plant, a co-operative study might be undertaken by the authorities of these places.

It has been unanimously agreed that a permit be withheld for the construction of the proposed combined sewers; and a permit is hereby and herein granted for the construction of a separate system of sewers under the following conditions and stipulations:

FIRST: That before any sewers are constructed, the township commissioners shall prepare a plan of the entire district included topographically, showing the streets and township and borough lines and thereupon shall be indicated the sanitary sewer system comprehensive and designed to collect the sewage of all the area and effect its conveyance to a single outlet. This shall be done in connection with the tentative selection of a site upon which may be erected sewage disposal works, which sewerage plans shall be submitted to the Commissioner of Health for approval.

SECOND: On submission of satisfactory plans, approval may be given for the construction of such separate system of sewers and for the temporary discharge of sewage therefrom into Chartiers Creek, but the temporary permit if granted to discharge sewage into the waters of the State, shall cease on the first day of July, nineteen hundred and ten. But if at that time the interests of the public health demand it, then the Commissioner of Health may extend the time in which such sewage may continue to discharge into the waters of the stream.

THIRD: If the Governor, Attorney General and Commissioner of Health deem it advisable and require the submission to the Commissioner of Health of plans for the purification of the sewage of any municipality in the valley of Chartiers Creek on or before July first, nineteen hundred and ten, then on request by the Commissioner of Health, the Commissioners of Chartiers Township shall prepare or cause to be prepared plans for the treatment of the sewage discharged from the sewer system herein approved and submit the same to the Commissioner of Health for approval.

FOURTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

FIFTH: Storm water shall be excluded from these sewers and further stipulations regarding the sewer system may be made at the time the plans for a comprehensive sewerage system herein called for shall have been submitted to the Commissioner of Health for approval.

SIXTH: This permit is granted under the further stipulation that it shall become null and void if the township commissioners fail within ninety days from November twenty-third, nineteen hundred and seven to prepare and file with the Commissioner of Health, a plan of the township showing the location and sizes and grades of all public sewers in the township, together with a satisfactory report in relation thereto, in conformity with the reqirements of act one hundred and eighty-two, approved April twenty-second nineteen hundred and five.

Harrisburg, Pa., December 31st, 1907.

COALDALE, SCHUYLKILL COUNTY.

This application was made by the borough of Coaldale, Schuylkill county, and is for permission to install a sewerage system and to discharge the sewage therefrom into Panther Creek within said borough limits.

It appears that Coaldale, a purely coal mining settlement, incorporated as a borough on February twenty-six, one thousand nine hundred and six, and having a population of thirty-seven hundred, is located in the celebrated Panther Creek District of the Southern Anthracite Coal Field of Pennsylvania, in Schuylkill county, the easterly boundary of the borough being the line between Schuylkill county and Carbon county.

Panther Creek drains the territory. It heads in Carbon county and flows in a southwesterly direction through a narrow deep valley between parallel mountain ranges, distance one and a half miles, (the northerly range being the Nesquehoning or Locust Mountains and the southerly range being the Pisgah or Sharp Mountains) traversing a distance of seven and a half miles, the last four being below Coaldale, and empties into the Little Schuylkill River at Tamaqua.

In consequence of the extensive coal operations and the small water-shed of the valley, most of the dry weather flow of Panther Creek is highly characterized by acid mine drainage. Even in wet weather, except possibly during short periods of general precipitation, this obtains. So life in the waters of the district has become nearly, if not wholly, extinct. The lower forms may exist in the sediment of the streams and in the flow during high water.

There are four collieries and breakers in the borough of Coaldale. These are owned by the Lehigh Coal and Navigation Company, together with most of the land in the town. In fact, said company owns the mineral rights in all of the Panther Creek valley, so it is reported, and operates all of the mines. There is no other industry in Coaldale. A mile above in Carbon county, is Lansford borough, population six thousand, where repair shops and mining machinery works are maintained by the Lehigh Coal and Navigation Company. The sewage of Lansford and from Summit Hill borough adjoining is discharged directly or indirectly into the creek. No other incorporated municipalities besides the above are located in the valley.

The citizens of Coaldale are supplied with water by the Panther Valley Water Company, a subsidiary corporation of the Lehigh Coal and Navigation Company, which company also supplies Lansford. The water comes from uninhabited mountain streams above the coal measures and appears to be very satisfactory.

The reservoir is located on Bear Creek from whence the water is conveyed by gravity in a line of pipe southerly across Nesquehoning Creek, through the Nesquehoning Mountain tunnel into Lansford and from there into Coaldale.

The water for colliery use is taken from Hauto Dam on Nesquehoning Creek and comes by gravity pipe line through the same tunnel to the collieries of Panther Creek Valley.

The public supply is said to be generally used by the inhabitants of Coaldale. There are few, if any, wells and cisterns.

At the present time the municipality does not have a sewerage system, either public or private, but a public system is contemplated.

Kitchen water and wash water are now emptied into street gutters or on the ground about dwellings. Privies and vaults abound. Not over six cess-pools are reported to be in use. While the incorporated territory of Coaldale comprises thirteen hundred and fifty-eight acres and extends two miles along the creek and in width about one-half mile on either side, the village of Coaldale proper, where the public buildings and most of the private dwellings are, comprises between thirty and fifty acres only. This tract is on the Pisgah Mountain slope from Panther Creek southerly.

There are also within the borough three small settlements,—Gerrytown, Bull Run and Centreville,—having a total population of about two hundred and all on the southern side of the creek.

In the main village the slopes are moderately steep, the geological structure is the conglomerates overlaying the coal measures, and the highways are chiefly dirt roads mixed with clay. So there is a marked erosion of street surfaces which makes desirable to some undetermined extent sub-surface removal of water.

The local authorities purpose to construct a combined sewer system which will serve, so it is reported, probably twenty-seven hundred people the first year.

The area of the proposed district is approximately thirty acres and the length of street thereon is four and one-half miles. There will be three and one-half miles of sewers, all of which will drain to the main intercepting sewer at the base of the slope and paralleling Panther Creek. This sewer is to start at the foot of Second street and terminate at Fifth street and empty into Fifth street district outlet, fifty-four inches in diameter.

The latter sewer is to be the outfall for the entire village and discharges the sewage into the creek below the culm dam in the vicinity of Fifth street.

When storms occur, the First Street sewer will overflow and discharge into Panther Creek through an eighteen inch pipe, and the Second street sewer will overflow and discharge into the creek through a thirty inch conduit. Ordinarily

the First street system will empty its flow into the Second street sewer at Water street and the flow of both be conveyed by an intercepting sewer which is to be seventeen hundred feet long and twelve to fifteen inches in diameter, and to discharge into a fifty-four inch outfall sewer at Fifth street.

The First street sewer district system is to comprise twenty-three hundred feet of sewer ranging in sizes from ten to eighteen inches in diameter.

The Second street sewer district system is to comprise forty-eight hundred feet of sewers whose sizes will range from ten to thirty inches in diameter.

The Fifth street system is to comprise eighty-four hundred feet of sewers, whose sizes will range from ten to thirty inches in diameter.

The fifty-four inch outfall will be about six hundred feet long.

The plan contemplates the removal underground of all street drainage. It is not always the case that so small a borough undertakes to accomplish so expensive an improvement. Usually surface water is conducted in paved street gutters short distances to natural water courses or through pipes for short distances to said water courses.

There is in the Fifth street sewer district a natural water course, dry most of the time, which by widening, straightening, deepening and enclosing could be permanently used as the natural course through which street gutter water would flow. If this improvement were it made would prove much cheaper and better, all things considered, than the proposed plan for that district.

Also for the other districts, numbers one and two, it is not apparent why the separation of storm water from sewage should not be accomplished.

While mine drainage is now exempted by law from those pollutions which must cease to be discharged into the waters of the State, it is by no means sure that these pollutions may not sometimes be subject to regulation. Although the acidity of Panther Creek no doubt renders its waters a disinfectant to a considerable degree, so that under ordinary conditions and during dry weather particularly, the sewage discharged therein at Lansford is deodorized and partially sterilized, yet it is not known that these effects are always assured throughout the year. So if it be true that little or no harm can come from the discharge into Panther Creek of sewage from Coaldale during dry weather and hence whatever danger to down stream population there may be must arise during storms, then it is apparent that sewage disposal works to treat the dry weather flow and to by-pass the sewage during storms into the creek, would entirely miss the point. Therefore, if the sewage is to be regulated and treated it should be during storms. For this reason house drainage should be collected in separate pipes from the conduits designed to carry street drainage.

Because it is possible for sewage from Coaldale together with deposits along Panther Creek to be brought down the Schuylkill during a freshet flow to Philadelphia in twenty-four hours or less, where said city draws upon said river for part of its source of supply, Coaldale sewage may be a menace to public health if drained into Panther Creek or its tributaries.

The Department is not informed as to the assessed valuation of the borough, but it is said to be about one million dollars. If this be true and with the present bonded indebtednesc of sixteen thousand dollars and thirty-five thousand dollars authorized by the electors for a sewer system, then the constitutional limit of the borough's borrowing capacity renders the installation of a sewage disposal plant at this time at least a very doubtful matter. But the future installation of such a plant should be contemplated.

There is a borough sewage ordinance passed on September nineteenth, one thousand nine hundred and six, which stipulates as follows:

"Section One, Be it enacted by the town council of the borough of Coaldale and it is hereby ordained by the authority of the same, That the house sewerage system of the borough of Coaldale is intended to take all water which has been soiled while performing and service within the buildings of the borough and no citizen shall discharge any water from any other source or character into said sewer."

Hence the local authorities anticipated a sanitary sewerage system, but the engineer employed to design the system has made other arrangements.

The proposed sizes are much larger than necessary to remove house drainage. Six inch pipes on grades in excess of four per cent. are permissible and the largest sewer of the system of Coaldale borough need not be over fifteen inches. As now planned it will be fifty-four inches.

A sewer permit issued by the Commissioner of Health on October eleventh, one thousand nine hundred and six, to the borough of Lansford gave a temporary right to discharge into Panther Creek pending the selection of the method of disposal works. Such rights cease on November first, one thousand nine hundred and eight, but the Commissioner may extend the time. In anticipation of the necessity for the ultimate treatment of the borough sewage, the Commissioner of Health stipulated in said permit that tests would be instituted by the State to determine the most economical and efficient means of disposing of said borough sewage, having in mind the possibility of utilizing the waste mine waters with apparatus designed and built for the purpose, whereby under regulation and control the borough sewage could be chemically precipitated and clarfied and the effluent be rendered suitable to go into the stream where

natural and uncontrolled agencies would complete the work of sterilization, or at once accomplish as high a degree of purification as any ordinary disposal works.

The Lansford system was adopted prior to the law of one thousand nine hundred and five, so extensions to the system were permitted under the further condition that when required Lansford shall install an intercepting system for the separation of sewage from storm water. Economy and efficiency dictated this conclusion.

No such conditions obtained at Coaldale. The necessity for ever having to undo any part of Coaldale's system can be obviated. The plans should be modified now.

In view of the proximity of Coaldale to Lansford and the similarity of their sewage disposal problems and the relation of each with the Lehigh Coal and Navigation Company, and in view of the other considerations, it has been determined that the interests of the public health demand that a permit be granted and it is hereby and herein granted for the installation of a sewerage system, under the following conditions and stipulations:

FIRST: That the proposed plans be ordered changed, the changes to include the reduction in sizes of the sewers to such diameters as may be necessary for the removal of house drainage only, and that when so changed the plans shall be submitted to the Commissioner of Health for approval and no sewers shall be constructed and used until this be done.

SECOND: That all street and surface water shall be excluded from the sewerage system and at close of each season's work plans of the sewers built under the system hereby approved during the year, shall be prepared and filed with the Commissioner of Health, together with any other information in connection therewith which may be required.

THIRD: No pathogenic materal from any laboratory shall be discharged into the system. The proper authorities shall cause these wastes to be destroyed on the premises.

FOURTH: This permit to discharge sewage in the waters of Panther Creek shall cease on the first day of November, one thousand nine hundred and eight, but if the borough shall have complied with the other conditions of this permit, then the Commissioner of Health may extend the time in which sewage may be discharged into Panther Creek from said borough sewerage system.

FIFTH: In anticipation of the ultimate treatment of the borough's sewage, the Commissioner of Health may institute tests in the borough to determine the most economical and efficient means of disposal of said sewage and the borough officials shall assist the Department of Health if required by temporarily providing land and ample facilities whereupon said tests can be most advantageously conducted.

SIXTH: If at any time the sewerage system or any part thereof, in the opinion of the Commissioner of Health, be a nuisance or menace to public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may advise or approve.

The local authorities should be advised that there is a community of interest relative to sewage disposal works, involving the concern of Summit Hill, Lansford and Coaldale boroughs, and since the Lehigh Coal and Navigation Company's engineer does the municipal engineering work in all three boroughs and this corporation will undoubtedly be glad to aid and abet any well-conceived and clearly desirable sewerage improvement for the three boroughs and since it might possibly be best when the time shall have arrived that the sewage of these municipalities be conveyed to one point below Coaldale and there be subjected to treatment, the present time offers the opportunity, if Coaldale borough will accept it, to call for a conference of the local authorities of all three boroughs for the purpose of discussing the feasibility of incorporating this idea in the designs of the sewerage system in each place. Summit Hill borough is now modifying its plans pursuant to a decree of the Department of Health relative thereto.

Harrisburg, Pa., August 16, 1907.

COLUMBIA, LANCASTER COUNTY.

This application was made by the borough of Columbia, Lancaster county and is for permission to build a system of sewers and to discharge the sewage therefrom, untreated, into the Susquehanna River within the limits of the borough.

It appears that Columbia is a borough of about thirteen thousand population, located on the east bank of the Susquehanna River in Lancaster county. It is essentially a manufacturing and railroad town, being favored with branches of the Pennsylvania Railroad and the Philadelphia and Reading systems. A combined railway and highway bridge spans the river at this point and adds to the borough's advantages. The town is located on two hills locally known as East and West Columbia, the dividing line being Shawnee Run, which flows down from the north-east between the hills joining the river about the central part of the borough. The Pennsylvania Railroad follows the bank of the river,

and the Philadelphia and Reading Railroad extends up the Shawnee Valley. The industries are chiefly located here, and between the Pennsylvania Railroad and the river. The older section and business part of the borough is on the rising ground in West Columbia. The newer portion is in East Columbia.

The public highway nearest the river and paralleling it is named Front street. Other highways extending in about the same direction back to the borough limits are designated respectively Second to Sixteenth streets, inclusive. Streets at right angles to them and the river are alternately paralleled by alleys. The most important of these streets in West Columbia are Walnut, Locust, Union and Mill streets, and in East Columbia, Manor street. The hills, back into which they extend, have elevations of about one hundred and fifty feet above Front street. Rain water comes down rapidly from the height, principally in the streets, whose surfaces are thus scoured, and would flood out the railroads on its way to Shawnee Run or the river, were not storm drains provided at various places to conduct the torrents underground beneath the railroads to the streams.

There are about two thousand eight hundred houses in the town. Possibly five hundred of them are provided with modern water-closets and dispose of the house sewage into cess-pools, sometimes called sinks, dug to the underlying limestone rock through which crevices the liquid may pass away to a greater or lesser extent. The great majority of dwellings have the ordinary privy arrangement for the disposal of excrement, kitchen and laundry waste being disposed of in these instances chiefly into the street gutters, where it may ultimately find its way into the storm drain at the foot of the street. This method of slop water disposal is sometimes productive during hot weather of objectionable odors, so it is reported.

The street gutters on the hillsides are from two to four feet wide and from six inches to two feet deep. They furnish the principal means of drainage for the built up portion of the town.

Relative to water supply, a few springs at the foot of the hills in Shawnee Valley furnish drinking water for a large number of employees at the plants along the run. The springs are at the base of the hills upon which cess-pools in the limestone rock abound. The use of these waters, coupled with the persistence of typhoid in the town since the installation of the public filter plant, is significant. The Pennsylvania Railroad has its own system and several of the manufactories use stream water for industrial purposes.

But the major part of the water is furnished by the Columbia Water Company, which takes its supply from the river at the foot of Walnut street, just above the central part of the borough. The water is mechanically filtered and then pumped into the pipe systems of the town, overflowing into a four million gallon storage reservoir located in West Columbia at a sufficient elevation to supply the town by gravity at night when pumping ceases. There are about twenty miles of surface mains in the system, ranging in sizes from four inches to sixteen feet in diameter. About every house in the borough is supplied with this water. It is reported that not over eight private wells are in use in the district. The average daily consumption is three quarters of a million gallons.

The Pennsylvania Railroad Company supplies raw river water to its shops and locomotives. The pumping station and intake are at the foot of Bridge street which is about eight hundred feet farther up stream than the water company's intake. The water is forced into two reservoirs. One is located near by at the west yards of the company and the other is located at the east yards about one mile distant. The west yards are supplied with the filtered public water for drinking purposes, but it is reported that at the east yards the raw river water is used for drinking purposes, for filling water tanks on passenger coaches and for industrial and locomotive purposes.

The following places use spring water for drinking and Shawnee Run water for industrial use: Johnson Steel and Iron Company, Susquehanna Iron and Sheet Company and East Side Mill, Pipe Mill. The places using spring water are Henry Hollinger's tannery and the Herbert Ice Manufacturing plant.

There is a spring on the bank of the run near the Philadelphia and Reading station which is contaminated by a stream of kitchen drainage from the corner of Fifth and Mill streets.

The town filter was put in operation April, one thousand nine hundred and three. The following record of typhoid cases and deaths up to May first, one thousand nine hundred and six, was furnished by the Columbia Board of Health:

Year.	Number of Cases.	Deaths.
1900,	47	9
1901,	24	7
1902,	40	5
1903,	57	16
1904,	54	11
1905,	44	7
1906,	9	1

The local hospital receives cases from out of town. Much of the disease has been attributed to the use of polluted well water and springs. It is said that there has been an absence of sickness among those who use filtered water only.

There are no public sewers for sewage only in the borough.

Lockharts Hollow Run is a small open stream in the western part of the borough, rises in the hills and comes down in an open ditch through the Pennsylvania Railroad yards at Second street where it enters two thirty-six inch pipes extending under said yard to the old canal bed. The flow follows the canal bed and enters the river near Bridge street above the town's water works intake which extends out into the river about two hundred and sixty feet. It is reported that the silk mill has a private sewer connected to this run at Second street.

The next water course which receives some sewage enters the river on the down stream side of the bridge about seven hundred and fifty feet above the said water works intake. It is known as Bridge Street Run, rises on the hills about one thousand feet north of the borough line and is an open ditch receiving storm water from the streets in the borough to a point about two hundred feet north of Fourth street. The remainder of its course is walled up and covered over. Where it enters the river it is four by ten feet. The stream receives more or less kitchen drainage for its entire length and sewage is discharged into the covered portion from the Pennsylvania Railroad shops and the Laundry Machine Company's plant.

Next in order down stream are two surface drain pipes, twenty-four and thirty-six inches in diameter each. They pass under the railroad tracks to the river at the foot of Walnut street. Sewage from the Pennsylvania Passenger Station goes into one of these pipes. The water works intake is at this point but two hundred and sixty feet out into the stream.

Next are two stone culverts, each three feet by three feet, extending to the river from the foot of Locust street.

A three by four foot storm drain passes under the railroad to the river from the foot of Alley I. Sewage from the Philadelphia and Reading Passenger Station goes into this drain. Below Alley I comes the sewer in Alley J, it begins at Fourth street and extends to the river, a distance of about sixteen hundred feet, empting into the river through a twenty-four inch pipe. Its office, similar to the other drains, is to carry off rainwater and kitchen drainage. Possibly sewage from four direct connected dwellings is discharged therein.

Union street drain begins at Front street, is a thirty inch pipe, passing under the tracks of the Pennsylvania Railroad to the river.

Next comes the Shawnee Run. This stream shows the first signs of pollution at the Hollinger tannery, which pollution continues to the mouth.

In one thousand nine hundred the East Columbia Land Company developed a tract of land into streets and house lots, erected houses thereon and constructed a stone drain in Barber, Mill, Thirteenth and Twelfth streets to Manor street. At the end of this drain there is not a sewage pool. It is drained by an open channel, which passes down through a swale and across private property to the railroad at the foot of Plane street, from whence the flow passes underneath the railroad tracks in a thirty-six inch pipe to the river. Laundry water is discharged into the said pool, and all along the open course the stream presents a foul appearance in the summer time.

The proposed sewer system is designed on the assumption that no injury will be caused anyone by the discharge of sewage into the Susquehanna River some distance below the intake of the public water works system, but the borough's expert expressed himself relative to the discharge of sewage into the river above said intake as follows:

"While the water supply is subjected to mechanical filtration, this cannot be absolutely relied upon to remove all bacteria; and it would seem to be absolutely indefensible to discharge house sewage with its possible typhoid bacteria where it can reach the intake. A very large part of ordinary house sewage floats upon the surface of water, and a very strong south wind might move it against the current for some distance. House sewage, therefore, certainly should not be discharged above the intake, or at either Walnut or Locust street."

Certain alley and streets in the town are at present almost impassable during and after heavy rains. Deep gutters have been worn out by the scouring force of the rain-falls and street surfaces have been badly washed. These deep gutters are dangerous as well as inconvenient to the public. Moreover, it is desirable, from an economic as well as a sanitary standpoint, to provide sewers for the removal of household wastes provided with modern sanitary facilities. Furthermore, the permanent paving of the streets in the business part of the town is contemplated, and this renders imperative the closing up of the deep gutters. In fact, whatever permanent drainage improvements are called for in this district should be made prior to the paving improvement. The proposed plans are intended to obviate the existing nuisances and to afford facilities for the removal of surface water and drainage not only in the centre of the borough but for the entire municipality in the end. In this respect the borough authorities have shown commendable foresight.

Where drains are to be constructed to prevent street flooding, house sewage is to be permitted to enter. Such conduits are termed combined sewers. Where house sewage is to be removed only, a small pipe is provided in the street and is designated as sanitary sewer. In three cases drains are provided to remove surface water only to the nearest stream. They are to empty into Lockharts Hollow Run, the river at the foot of Bridge street, and Shawnee Run at Ridge avenue, and their diameters are, respectively, eighteen inches, forty-eight inches and fifty-four inches.

The combined sewers have two principal outlets into the river. One at the foot of Mill street at the mouth of Shawnee Run, two thousand eight hundred feet down stream from the water works intake, and the other at the foot of Plane street in East Columbia, over a mile below the water works intake. The plan contemplates that the entire sewage of all of West Columbia and that part of East Columbia in Shawnee Valley shall be collected by gravity during dry weather periods and discharged into the river at the foot of Mill street. But during storms, to obviate the conveyance for long distances under ground of large quantities of water, the mingled sewage and storm water will overflow and pass into Shawnee Run and the river at the following places:

Into Shawnee Run: Union street thirty-three inch sewer, Ninth street thirty inch sewer, Front street forty-two inch sewer.

Into the river, Alley J sixty inch sewer, Perry street forty-eight inch sewer.

The Alley J storm overflow is twelve hundred feet below the water works intake and the Perry street overflow two thousand feet below it.

The borough's expert says, with respect to the over-flows:

"Since when these act the sewage will be greatly diluted with rainwater, and the streams themselves will be high; since none of these discharges within a thousand feet of the water works intake, and since Shawnee Run is already so polluted as to be totally unfit for drinking water, the amount of sewage discharged at infrequent intervals will not be sufficient to cause a nuisance, this method of reducing the cost of many thousand dollars is recommended."

The combined sewer outlet at the foot of Plane street will discharge into the river the entire sewage of the remaining part of the borough in East Columbia, together with the storm water from this district. It is to be substituted for the open run, thus permitting the abandonment of said run.

The separate sewers comprise by far the principal portion of the proposed system. They are usually eight inches in diameter. All roof and storm water is to be excluded from them. In every instance they finally empty into a combined sewer. The design contemplates that ultimately a population of thirty thousand people uniformly distributed over the present limits of the municipality will contribute to the separate sewers. They are to be provided with flush tanks on dead ends, laid to a minimum depth of seven to eight feet, no traps are to be placed on the house connections, and it has been recommended that the main trap be prohibited on the house soil pipe, but instead that these pipes be extended full diameter above the roof and a vented trap be placed on each fixture in the house.

It appears that the proposed system comprises one and seventy-seven hundredths miles of drains that will take nothing but storm water, and twenty-three and eight-tenths miles of sewers of which five and forty-six-hundredths miles will take mingled sewage and storm water and eighteen and thirty-seven-hundredths miles will take house sewage only. Therefore, twenty-three per cent. of the sewer system is to be on the combined plan and seventy-seven per cent. on the separate plan.

The Susquehanna River enters the Chesapeake Bay at Havre de Grace, which town is about forty-five miles below Columbia. The last fifteen miles of the stream is in the State of Maryland.

The State Board of Health of Maryland has advised the Department of Health of Pennsylvania that Maryland has a sanitary interest in the waters of the Lower Susquehanna River, since these waters are the natural source of supply to that state. Havre de Grace at present derives its supply from the Susquehanna River and filters the water. At a date not very distant, the city of Baltimore may, in the opinion of the State Board of Health, look to the Susquehanna for a water supply. Therefore, Pennsylvania has been asked to keep the interests of Maryland in mind when decisions are reached relative to the use of the river as a channel of sewage disposal by Pennsylvania towns.

Along the river below Columbia, Washington is the only borough or town until Port Deposit is reached which is about opposite Havre de Grace. Port Deposit obtains its supply of water from small streams.

It is in this stretch of the river that two large power dams are being erected, one of them, McCall's Ferry Dam, being in Pennsylvania. It is quite possible that these enterprises may promote the springing up of industrial communities along the river, entirely change the general aspect of the country and make demands upon the Susquehanna River as a source of drinking water which would call for the enforcement of prohibitions against the discharge of sewage into the river that present conditions do not seem to demand.

The city of Harrisburg is thirty miles above Columbia. Between the two places on the river are the boroughs of Steelton, Highspire, Middletown, Marietta, New Cumberland and York Haven, which discharge their sewage directly into the stream, and the city of York on the Codorus Creek, whose sewage indirectly reaches the river above the water works intake of the Columbia Water Company. Therefore, the preservation of the public health in Columbia, depends, in a measure, upon the protection of the Susquehanna River above Columbia. The proposed sewer system is designed to obviate the pollution of the borough's water supply, but if constructed as now proposed, it will place an unnecessary and enormous tax upon that municipality when the interests of the public health in the country below Columbia demands a cessation of the pollution of the river at all points above.

State sanction should not be hastily given to a sewerage plan whose construction would materally hinder or render prohibitive subsequent treatment of the sewage.

Seventy-seven per cent. of the sewers of the proposed system are to be built on the separate plan. If all of the system were to be built on this plan, then when the necessity should arise for the purification of the sewage, the only expense involved would be the moderate one of the disposal works for the treatment of house sewage only, while if part of the sewers were built as proposed on the combined system, then when the treatment of the sewage became necessary, some means would have to be devised for the separation of the house sewage from the storm water, since it would be absolutely impractical to build sewage disposal works for the treatment of the enormous volume discharged during storms by the combined sewers.

It is possible to effect this separation now at no greater cost than the cost of the proposed combined system.

In these streets where it is necessary to remove surface water by underground conduits, the following plan can be carried out at a saving in cost to the borough over the building of a combined sewer in the same streets. A reinforced concrete viaduct about four feet wide by two and one-half feet deep with invert should be constructed on each side of the street in the gutter in such a way that the inner side extended up to the surface of the sidewalk would form a concrete curb-stone. The concrete covering over the aqueduct would form the surface of a new street gutter, and at frequent intervals therein would be placed the ordinary gutter grates for the admission of water to the drains. These viaducts would be above water and gas connections, and being on each side of the street would permit of cheap roof water connection where desired. Nothing but storm water would be admitted to these drains and they would empty into the river or nearest natural water course at proper points. In the centre of the street at the customary depth, separate sewers for house sewage only would be laid. This plan can be carried out including the building of the separate, and the two shallow drains, at no greater expense than the cost of building a large reinforced concrete combined sewer placed in the centre of the street at a depth sufficient to be below gas and water pipes and to admit of house sewage.

Besides, the new plan will afford a concrete curbstone and a concrete gutter six to eight inches below the curbstone and about five feet wide on both sides of the street for its entire length. The benefits to abutting estates and to the public in general from this improvement to the highway surface are immediately assured by the new plan and without additional cost. Then too, the expensive combined sewer in Front street can be avoided, a small separate sewer only being necessary here.

In a general way it has been ascertained that by the above modifications in the proposed sewerage plans, increased benefits can be conferred at once upon the public and tax-payers in the borough, and at less expense than if the modifications were not made, and that the plans as modified, will effect a very great saving in future public expenditures when the time shall have arrived for the purification of the borough's sewage.

The assessed value of real estate in Columbia for one thousand nine hundred and six is reported at three million five hundred and thirty-nine thousand nine hundred and eight dollars. Thus the constitutional limit of indebtedness is approximately two hundred and forty-eight thousand dollars. The borough's funded indebtedness is reported to be one hundred and thirty-three dollars. In round numbers a further debt of one hundred and ten thousand dollars may be incurred. The estimated cost of sewering the built up portion of the town is one hundred thousand dollars, and a bond issue for this purpose has been contemplated.

There is no room for the location of a sewage purification plant in the borough except in the extreme south-eastern corner where Strickler Run joins the river. The cost of such a plant is beyond the financial ability of the borough at this time.

The petitioners, having shown the necessity for the conveyance of sewage below the water works intake, the necessity for improved surface drainage being apparent, and the laying of sewers in streets prior to the paving of their surfaces being commendable, it would seem desirable that the Department should act favorably on these matters.

In view of the foregoing facts it has been unanimously agreed that the Pennsylvania Railroad Company should be requested to desist from furnishing raw river water for drinking purposes, and that in this connection the local board of health be requested to make frequent inspections and reports relative to whether such water is used for filling water tanks on passenger coaches or for drinking purposes at the shops.

Furthermore, it has been determined that the local board of health should be requested to make an examination of springs and wells in the borough, whose waters are used for drinking purposes and if said waters be found to be polluted, thereupon such polluted sources should be abandoned by order of the local authorities.

It has also been unanimously agreed that the interests of the public health demand that the borough of Columbia be given permission, and such permission is hereby and herein granted to said borough, to construct a system of sewerage and to discharge the sewage therefrom into the Susquehanna River, within the limits of said borough, under the following conditions and stipulations:

FIRST: That the plans now proposed by the borough shall be so modified that all roof and surface water shall be excluded from the sewers, and that all sewage shall be excluded from the drains.

SECOND: That the sewer plans modified as herein required, shall provide for the ultimate conveyance of all of the sewage of the borough to some common point from whence the sewage can be advantageously delivered to sewage disposal works when the time shall arrive for the discontinuance of the discharge into the river of the borough's sewage, the sewer plans as so modified shall be submitted to the Commissioner of Health for his approval, who may modify or amend the same and fix rules and regulations with respect to the operation and maintenance of said system.

Harrisburg, Pa., March 8, 1907.

CORAOPOLIS, ALLEGHENY COUNTY.

This application is made by the borough of Coraopolis, Allegheny county, Pennsylvania, and is for permission to extend its sewer system and to discharge the sewage therefrom, untreated, into the Ohio river, within the limits of the borough.

It appears that the borough of Coraopolis is principally a residential community of about five thousand four hundred people, situated on the south side of the Ohio river about thirteen miles below the junction of the Allegheny and Monongahela rivers and about sixteen and one-half miles above the point where the Beaver river empties into the Ohio. It is bounded on the east by Robinson township and on the south and west by Moon township. The inhabitants engage in business in Pittsburg or are supported by employment in the manufactories in or near the borough. As is true of many of the suburbs of Pittsburg, Coraopolis is growing rapidly, houses are in demand and real estate activity foretells a continued increase in population.

The principal industry of the town is the Consolidated Lamp and Glass Company, employing about four hundred hands. Immediately west in the township is the refinery of the Pittsburg Refining Company and immediately east of the borough is the repair shop of the Pittsburg Coal Company, employing one hundred and eighty hands. Still farther east is the plant of the Lewis Foundry and Machine Company, employing about three hundred hands. It is thought by people acquainted with local conditions, that the construction of the new shops of the Jones-Laughlin Company to within about six miles below Coraopolis on the river, will result in an inflow to the borough for a place of residence of the better paid employees of said company.

The principal growth is likely to take place in the hilly sections in the southern part of the town.

The thoroughfares paralleling the river are named in order First, Second, Third Avenue, etc. State Avenue is beyond Fifth Avenue and between it and the river the land is comparatively flat, having slopes towards the stream not exceeding three or four per cent. This portion is liable to inundation during extreme freshets of rare occurrence. South of State Avenue, the slopes are at once steeper, some of the streets at right angles having grades reaching fifteen per cent. In this portion there are several deep ravines running approximately at right angles to the river, which constitutes natural channels for storm drainage. Some of these ravines have been filled in and are not now visible in the flat portion of the town, in fact the only exception being the run lying between Montour and Maple Streets in the eastern part of the borough, known as McCabe Run. Montour Creek, which forms the immediate boundary line between Coraopolis and Robinson township, rises about twelve miles to the south and forms the boundary between Findley and north Fayette townships, Moon and Robinson townships. The creek empties into the river just above the down stream end of Newville Island, which island extends up the river about five miles and terminates near Davis Island where there is a dam across the river. Much of the flow is cut off from the "back river," so called, lying on the south side of the island because of the said Davis Island

dam. There is a second dam across the main or north channel of the river a little over one mile above Coraopolis and dam Number Three extends across entire river about one-quarter of a mile below Coraopolis. The back river has a very sluggish current at ordinary and low stages of the river. Just below Dam Number Three, on the opposite side of the Ohio river, is the intake crib of the Sewickley water works, from which water is taken to supply Sewickley borough and the borough of Osborne, directly opposite Coraopolis.

The latter place also takes its supply from the Ohio river through two filter cribs sunk in the gravel in the southerly side of the main channel of the river. The works are owned and maintained by the municipality and no plans thereof have been filed with the State Department of Health as required by law. It is reported that the general health of the borough is good, and that there have been two cases of typhoid fever since the beginning of the year. The local health authority states that the average number of cases of this disease has been six or less per year for the last five years, except during one year when the water was pumped from the "back river," which water is polluted by the borough sewage.

It is also reported that extensions have been made to the water works system within a year, consisting of an additional crib. No application was made or approval given by the State to such additional source of supply.

It appears that the larger part of the properties on the hills south of State Avenue have private bored wells from which drinking water is obtained. The three principal springs in use by the public are McCabe's, located under the culvert at State Avenue, Ritter's Spring, on Fifth Avenue, east of Wood Street, and Ritter's Spring, on Fifth Avenue, east of Locust Street. The first is said to be used but little, if any. The land around it is occupied by houses; but the other two springs are in extensive use. The one east of Wood Street is walled up with dry stone masonry and imperfectly protected, but the other is enclosed with cement masonry and well housed.

Bored or drilled wells are generally used at the industrial plant in the borough and vicinity. No sickness has ever been attributed to the use of any of these private supplies according to report.

The extensive use of ground water for drinking purposes taken from territory occupied by dwellings is a custom surrounded with insecurity at best and liable to prove prejudicial to public health. Next to a wholesale abandonment of such drinking supplies, the speedy removal of sewage from the district and the proper disposal thereof is most important.

The public sewers are on the combined plan and empty at five different points along the Ohio, in what is known as the "back river." In their order up stream from the lowest they are as follows: a twenty-four inch outlet at the foot of Watt Street, serving about eight thousand four hundred and seventy feet of pipe whose diameters range from twenty-four inches to ten inches; a twenty-four inch outlet at the foot of Main Street, serving about seven thousand one hundred and eighty-five feet; a twenty-four inch outlet at the foot of Mill Street, serving about seven thousand feet; a twenty-four inch outlet at the foot of Broadway, serving about eight thousand seven hundred feet and a twenty-four inch outlet at the foot of Arch Street, which is practically at the mouth of McCabe Run, serving a district in which there are thirteen thousand eight hundred feet of sewer; making a total of about eight and one-half miles of sewers in the borough, whose sizes range from ten to twenty-four inches in diameter.

All of the said outlets are above and some distance from the edge of the water at ordinary and low stages of the river, and at the time of the Department's inspection there was some accumulation about said outlets.

Many of the sewers are reported to be too small to carry off the storm water drainage, much of which flows off along the street gutters to the natural water courses.

There are a number of outside privies in use in various parts of the borough and there are some cesspools mostly constructed of tight masonry.

Along Main Street, south of Highland Avenue, is a row of fifteen houses, most of which have outside privies, either on the banks of the ravine or overhanging the run at the bottom of the ravine. During rains it is said that the contents of the privies are washed into the run and the accumulations there render the pools extremely offensive during dry weather.

From the plant of the Consolidated Lamp and Glass Company, located near McCabe Run, there is a private sewer conveying all waste from the factory to the river. The Canfield Oil Company in the lower part of the borough has an open ditch to the river into which two water courses are reported to discharge.

The petitioners represent that the present sewer system which was constructed from time to time since the incorporation of the borough in eighteen hundred and eighty-six is perfectly adequate to accommodate the territory already drained, and that owing to the construction of new buildings it is necessary to extend the line now in use. It is proposed to immediately construct five hundred feet of ten inch pipe and three hundred and seventy-five feet of eight inch pipe in Fourth Avenue, fourteen hundred feet of ten inch

pipe in Ferree and Montour Streets and on Vance Avenue. About one thousand feet of ten inch pipe on Main Street south of Hilliard Avenue, seven hundred and fifty feet of ten inch pipe on Seventh Avenue, and three hundred and seventy-five feet of ten inch pipe on Fifth Avenue, all of which is shown on the plan accompanying the application.

Eleven miles below Coraopolis, the borough of Aliquippa and the borough of Baden takes its water from driven wells in the Ohio river. Thirteen and one-half miles below Coraopolis, the borough of Freedom takes part of its supply from the river and the borough of Beaver, seventeen and a half miles below Coraopolis, is also reported to use river water.

In view of the discharge of sewage which is taking place into the Ohio river and its tributaries from the municipalities along their banks, and in view of the fact that the river must continue to be the source of drinking water for many of these places, it is not strange that typhoid fever is prevalent in the district. And so long as the defiling of the river, from which the supplies of drinking water are directly or indirectly drawn, continue, there will also be a continuance of typhoid fever, which at times must appear in epidemic form. Even where the most modern apparatus provided with every facility for regulation and control and cleaning and renewal is constructed, it is extremely necessary that constant care should be exercised to render the sewage polluted source a pure and wholesome supply. Hence, most certainly is apparatus such as a filter crib sunk in the bed of a sewage polluted river and not susceptible to regulation or control, a suspicious means of rendering drinking water potable. Accidents to any purifying apparatus will occur and they become worn out or over-taxed in capacity, all of which argues for the preservation of the purity of the original supply to as practical a degree as possible. In the interests of public health at Coraopolis and other places, it is demanded that sewage shall be ultimately treated before being emptied into the river.

From the standpoint of expediency, it is desirable that modern plumbing facilities should be provided in the new building being erected in Coraopolis, and also that sewers should be provided to admit of the abatement of existing nuisances. On part of the streets in which the said sewer extensions are desired, paving is contemplated, and the local authorities are forehanded in planning to construct the sewers before completing the pavement.

The assessed valuation of the borough is reported to be about four million dollars and the bonded debt about one hundred and seventy-five thousand dollars. If these figures be correct the borrowing municipal capacity is in the neighborhood of one hundred thousand dollars. This is not enough money with which to defray the cost of separating sewage and storm water and providing sewage disposal works. Since the sewers are too small for surface drains, they may continue to be used as combined sewers, unless the surcharging of them should backflood private estates and prejudice public health until the time when sewage purification works are constructed.

It is not practicable, on account of prohibitive cost, to treat both sewage and storm water and hence, sometime before the works are built, the borough will be obliged to effect a separation, to as practicable degree as possible, of drainage of roofs and streets from the household wastes. Undoubtedly, from time to time larger drains for storm water removal will be required. The admission of roof water to the sewer system should be only granted under terms permitting of a discontinuance of such admission at any time found necessary, and the problem of surface drainage and of sanitary sewerage and purification of the sewage should be studied at this time, and general plans laid out, so that no part of such improvements from now on may need to be abandoned, but that all shall be a part of one complete system. A site or sites for the location of a sewage purification plant should now be considered and also the method by which the sewage is to be collected and conveyed to such plant.

It has been determined that the municipal officers be notified and they are hereby and herein notified that they have neglected to comply with the law with respect to filing a report and plans of its existing water-works and with respect to making application for permission to increase the source of supply and extend the water works, and that unless on or before the first day of January, one thousand nine hundred and eight, detail plans of the intake cribs, pipes, pump wells and pumping station and plant, force mains, reservoirs and distributing system, showing location and elevations with a full description thereof as required by law, by filing in the office of the Commissioner of Health, and that unless on or before said date an application for approval of the increasing of the source of supply and the extensions to the water works made since April twenty-second, nineteen hundred and five, shall have been filed with the Commissioner of Health, the Department will be forced to enforce the penalties prescribed for such violations of the law.

It has also been determined that the interests of the public health demand that a permit be issued and it is hereby and herein issued for the proposed extensions of lateral sewers under the following conditions and stipulations:

FIRST: That on or before May first, nineteen hundred and eight, the borough shall submit plans for the collection of the sewage of the entire municipality and for its conveyance to one common point, and for the erection there of a sewage disposal plant for the treatment of such sewage, and submit the

same to the State Department of Health for approval. When such plans have been modified, amended or approved, the Commissioner of Health will fix a time when the purification plant shall be constructed and put in operation comparable with the State policy adopted or to be adopted with reference to the purification of sewage in other boroughs in the vicinity along the river.

SECOND: This permit to discharge sewage into the waters of the State shall cease on the first day of May, nineteen hundred and eight. If at that time the other terms of this permit shall have been complied with, the Commissioner of Health may extend the time in which such sewage may be discharged into the waters of the State.

THIRD: Owing to the use of private springs and wells in proximity to dwellings, it is desirable from a general health standpoint to remove household wastes from the premises as speedily as possible, and, therefore, the borough authorities shall, by ordinance or otherwise, compel occupied abutting estates to connect with and use the public sewerage system at as early a date as may be found practicable.

FOURTH: On or before the first day of January, nineteen hundred and eight, the borough shall submit a satisfactory plan of its existing sewer system showing grades, sizes, location of manholes, together with a satisfactory report, using the blank form furnished by the Department for the purpose. Special reference shall be paid to the profile of each sewerage outlet.

FIFTH: If at any time, in the opinion of the Commissioner of Health, the sewerage system, or any part thereof, shall become prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

SIXTH: No pathological material from any laboratory shall be discharged into the system. The proper authorities shall cause these wastes to be destroyed on the premises.

The borough's attention is especially directed to the suspicious origin of drinking waters derived from springs and wells in the district. Tests of these waters should be occasionally made and the sources condemned if found polluted.

Harrisburg, Pa., November 2nd, 1907.

CRESSON, CAMBRIA COUNTY.

This application was made by the borough of Cresson, Cambria county, Pennsylvania, and is for permission to install a system of sewerage and to discharge the sewage therefrom into a branch of the Conemaugh river, outside of said borough, within the limits of Cresson township.

It appears that Cresson is located on the main line of the Pennsylvania railroad in the mountains about fifteen miles west of Altoona on the summit between the water-shed of the Ohio and the water-shed of the Susquehanna river. A small part of the village is in the latter basin, but most of it drains into the former.

The population is about twelve hundred and the citizens are mainly employed by the railroads and the Pennsylvania Coal and Coke Company, whose operations are handled at the office maintained in the borough.

Besides the main line of the Pennsylvania Railroad, which is in a saddle and separates Cresson borough into an east and west side, and also Cresson borough from Sankertown borough, lying immediately to the west, there is the Cambria and Clearfield Branch extending westerly through Sankertown, and the Cresson and Irvona Branch extending northerly through Sankertown. To all appearances the inhabitants comprise one community. Probably in both boroughs there is a population of about two thousand. Both are of recent incorporation and both use the same passenger station.

Owing to the elevation of the locality, which is about two thousand feet above the sea and in the centre of the Allegheny Mountains, the natural resources and accessibility, it is quite probable that the borough and its environs may again become noted for healthfulness. Formerly the Cresson Spring Hotel, now closed, was a famous summer resort.

Railroad roundhouses and offices and a brewery are located in Cresson borough and the freight yards and shops of the Cresson Machine and Car Company are located in Sankertown. All of the latter territory and a small portion of Cresson, both sides of the main line, including the brewery and the roundhouse, naturally drains northerly into Clearfield Creek. The remainder of Cresson borough drains southerly to Laurel Run, the head waters of Conemaugh River. This stream rises in springs on the mountain side within Cresson borough and flows down diagonally through the built up part of Cresson, gathering the waters of numerous small tributaries and reaching the main railroad tracks at the Philadelphia and Pittsburg turnpike, which is the southerly boundary of the borough. The celebrated Cresson Springs is at the foot of the mountain at said turnpike and the Cresson Station is nearby in the township, all to the east of the railroad. Laurel Run passes under the railroad through a culvert just north of the turnpike and thence pursues a general southerly course to the valley of the Conemaugh river which the railroad follows. Because the culvert is partially filled up, there is a mud pond formed in the borough at the turnpike.

The water supply of Cresson is obtained from various sources, some of the citizens have wells on their property, others are supplied by the water companies of which there are two and the railroad buildings are supplied with water furnished by the Pennsylvania Railroad Company.

The Pennsylvania Water Works are a part of a system which said company has constructed and operates all along its main line. There are two twelve inch mains passing through the borough, one line being in the upper part of the town in Sixth street the water being brought in from the Bear Rock supply, so called, and the other line is in the valley along the railroad, the supply being obtained from the source known as South Fork. Connecting these two pipe lines in Keystone Avenue is a six inch main and on it are hydrants from which the borough is said to have a right to draw water for fire protection purposes.

The Cresson Water Company, incorporated in eighteen hundred and ninety-six, takes its supply from springs located just outside of the borough on the mountain, collects it in the small earth reservoir roughly paved on the inside with stone, storing about one million five hundred thousand gallons, and having a water shed of about five acres of wood and pasture land. Fences are not kept in repair and cows are not prevented from standing on the banks of the reservoir. The supply becomes insufficient in summer and the deficiency is met by pumping water from a drilled well located nearby. From the reservoir the town is supplied by gravity and it is estimated that about five hundred people are furnished with this water.

The Rebecca Water Company, incorporated in nineteen hundred and one, obtains its supply from three springs located in the borough on Keystone Avenue, two being at the corner of Sixth Street, and one below Fifth Street. Each spring is walled up and roofed over. The geological structure of the borough is largely sandstone. Kitchen drainage flows in the street gutters by these three springs. On this system, which is small, is the public school, the Anderson House and the bank and post office buildings.

The Commercial House has a private supply from a spring on the hillside.

Cresson borough is full of surface springs and it is reported that one half of the population take water from driven wells, dug wells or springs.

There are no public but several private sewers in the borough. The first one is twelve inches in diameter, discharges into Laurel Run at the borough line and extends to near the Pennsylvania freight station. It receives sewage and probably surface water from four railroad company residences on the hill west of the railroad. The intention is to connect the roundhouse and brewery with this sewer and incorporate it in the proposed borough system.

East of the railroad in First Street near it is a six inch sewer and in the alley back of it there is a ten inch sewer, both having numerous water closet connections, if reports be true, and both discharging into a ditch in the alley and thence to Laurel Run above the Commercial House.

One of the tributaries of Laurel Run is diverted from its natural course for a part of its length in the borough through a pipe which is twelve inches in diameter at the outlet in the street gutter in Second street. On the day of the Department's inspection, this pipe was flowing at least half full. It is reported that numerous house connections discharge house sewage into it. Near the upper end of the water course there is a row of houses in Linden Avenue, belonging to the Pennsylvania Coal and Coke Company and occupied by foreigners, at which the privy vaults are overflowing and drain into the water course. From the outlet of the twelve inch pipe the flow is southerly in Second Street gutter to Laurel Run. This gutter also receives the drainage of overflow vaults in the rear of houses on Keystone Avenue between Third and Fourth Streets.

There may be other sources of pollution of the runs in the borough. Privies abound and there are cesspools of the percolating type. In the town east of the railroad the conditions are unsanitary. The springs maintain a constant flow in the various runs and street gutters, the discharge of kitchen drainage and sewage there and the constant overflow of surface privy vaults make open sewers which, in case of an outbreak of an epidemic, would greatly add to the peril of the situation.

The pond at the turnpike at the borough line receives all this drainage and is reported to be a nuisance during warm weather and a menace to the health of the community.

West of the railroad the conditions appear to be good, but there is a twelve inch sewer receiving sewage from the railroad offices and several residences on railroad property and waste water and sewage from the brewery and the round house, which empties into the head waters of Clearfield Creek near the railroad in Sankertown. If reports be true this sewer is owned by the brewery company.

Several private sewers in Sankertown empty into the creek and about two miles below on this stream there is an ice pond maintained by the Pennsylvania Ice Company of Altoona, from which ice is harvested and shipped in carloads to many parts of the Pennnsylvania Railroad system for use in icing tanks on passenger coaches and at stations, and so forth. It is reported that this is done under contract between the two companies.

Although the wells and springs are in proximity to cesspools and privies in some instances, there appears to have been little sickness in the town. It is reported that two cases of typhoid only occurred during the year one thousand nine hundred and six, and these were both imported.

The proposed sewer plan comprises a sanitary system of sewers, so called, but it is designed to take some street gutter water. The system as planned will cover the built up portion of the borough east of the railroad with possible extensions to the borough limits, and also for an extension of the existing twelve inch sewer west of the railroad and built last year by the railroad company, which sewer is to be taken into the public system in order that the brewery sewer outlet into Clearfield Creek may be abandoned, and the sewage wholly discharged into Laurel Run.

No provision is made in the plans for treatment of the borough's sewage at this time. The discharge is to be into Laurel Run, at a point in Cresson township about six hundred feet below the borough line, and opposite the Cresson passenger station; but the petitioners purpose to install a sewage filter plant in the future, so it is stated in the application. The main sewer outlet is to be twenty-four inches in diameter and the smallest eight inches in diameter, and the entire system will comprise two and fourteen hundredths miles, of which one half mile will be twenty-four inches in diameter, about one-half mile twelve inches in diameter, about one-half mile eight inches in diameter, and one-seventh of a mile eighteen inches in diameter.

The grades will be ample to secure self-cleansing velocities; that of the outlet which is the least will be seventy-five hundredths per cent. Ventilation is to be secured through perforated manhole covers, but the plans show no provisions for manholes at street intersections or changes in line and grade, except on the main sewer in Second Street.

The petitioners purpose to flush the sewers by admitting some surface water through inlets at street corners and also by connecting some of the sewers with springs about town. The specifications state that in case it is necessary to use cement joints at any special point, such joints shall be made when adjudged proper by the engineer.

The drainage area in the proposed sewer district and tributary to it comprises about six hundred and fifty acres of which about one hundred acres of which about one hundred acres are built up.

The proposed sewers are not large enough to serve as a storm drain and they are much larger than necessary for sanitary sewers. If necessity should require treatment of the sewage, it would be important from an economical standpoint, as well as from a standpoint of efficiency, that the volume to be handled should comprise sewage only, and not sewage migled with surface or storm water. It is the universal observation that sewers built on grades such as are proposed in Cresson, are very largely self-cleansing without the introduction of water other than that which comes through the plumbing fixtures in the buildings. An occasional inspection at manholes and flushing by hand with a hose when necessary, is the cheapest and a satisfactory way of maintaining the proposed sewer system. Because ground water is plentiful, in spite of greatest care in making the sewer joints tight there will be leakage into the sewers which will augment the flow. If the sewer joints were not purposely made tight by the use of cement, the infiltration would be so considerable as to amount to many times the volume of sewage discharged into the system from the dwellings, which volume would render the ultimate treatment works needlessly extensive and hence expensive to construct and to operate and maintain thereafter. To facilitate the inspection, cleansing and repairs, manholes should be built at all street intersections and at most changes in line and grade.

If the joints be laid in cement and Y branches be placed at frequent intervals along each sewer for house connections and be properly cemented and made water tight, and all surface water be excluded from the system, the outfall sewer may be safely reduced to fifteen inches in diameter and on grades in excess of four per cent., six inch pipe may be safely used.

Cresson is at the edge of the bituminous coal fields of Pennsylvania. Following down the Conemaugh valley, three miles below, is the borough of Lilly, four and a half miles below Bens Creek station, seven and a half miles below Portage borough, ten miles below Wilmore, fourteen and a half miles below South Fork, and twenty-four miles below the city of Johnstown. At each of these places strongly acid streams draining coal operations emptying into the Conemaugh river, and sewage is also discharged into the river. Twenty miles below Johnstown is the borough of Blairsville, and thirty-six miles below is the borough of Saltsburg, both of which places derive their source of public water supply from the river. Because no epidemic of typhoid fever has occurred in these boroughs, although the public supply is not subjected to filtration, it is evident that natural agencies of destruction are at work in the river, else the sewage from Johnstown would have sufficiently polluted the river at these boroughs to have infected the citizens there drinking the water. Probably no one factor is more potent in this work of destruction of sewage organisms than the acid discharged from the mains into the river and its tributaries. Nevertheless this and the other agencies are not subject to regulation and it

is quite possible during varied conditions in the river for sewage infection from any place on the water shed to reach these intakes at Blairsville and Saltsburg in a state sufficiently active to do harm. A project for the elimination of sewage from acid streams and the treatment of it is being considered with a view to adapting some process for the utilization of mine drainage when it may be economically diverted to the disposal works and it may be possible that within a few years sewage will cease to be discharged into acid streams as well as into other waters of the State. In any event, the preservation of the virgin purity of the upland waters in the coal fields is deemed most important and since Cresson borough is at the head of the Conemaugh valley and no mine drainage reaches the streams above a point near Lilly borough and two miles below Cresson borough line, and the petitioners do not show wherein public health demands that the borough's sewage should be permanently discharged into the Conemaugh River, but to the contrary it appears essential in maintaining a high standard of healthfulness of this mountain resort that all nuisances and menaces should be prevented; therefore, the stream should not be defiled, but the purity of the water should be preserved and the treatment of all of the sewage in the vicinity should be effected at the earliest possible moment.

There can be no doubt that the interests of the public health demand the abandonment of surface privies and cesspools and also private sewers now discharging into the runs and street gutters. All sewage should be intercepted in conduits provided for the purpose and removed from proximity of all buildings, springs, wells and dwellings to a point where works should be erected for the purification of the sewage.

The borough's valuation is reported to be two hundred and sixty thousand dollars and if this be true the borrowing capacity at present is about eighteen thousand five hundred dollars, of which nine thousand dollars has been authorized for sewer construction. By reduction in sizes of the sewers, and if thought advisable, an apportionment of some of the cost of the sewers, on abutting estates, and by prudent management in construction, the borough should have ample resources with which to defray the cost of the installation of sewage purification works, provided, of course, nothing but sewage were admitted to the system.

It is imperative that no sewage whatever be discharged into Clearfield Creek or its tributaries from Cresson or Sankertown borough or anywhere above the ice pond two miles below Sankertown. The latter borough needs public sewers and the system should be contributary to the Cresson borough system. It is good public policy to reduce rather than to increase the number of sewage disposal plants in the State and both economy and efficiency may be secured by a joint system when such works are feasible. The State Department of Health stands ready to use its good offices (in bringing about the discontinuance of the discharge of all sewage from Sankertown borough into any stream) to promote a general system of sewerage and sewage disposal for both Sankertown and Cresson boroughs.

It has been determined that the interests of the public health demand that a permit be granted and it is hereby and herein granted to the said borough of Cresson to install a new sewer system under the following conditions and stipulations:

FIRST: That all surface and storm water be excluded from the sewers, and that no existing sewers shall be incorporated into the system unless surface and storm water be excluded from them also and they be in a good state of repair and reasonably tight and free from infiltration.

SECOND: All sewer pipe joints shall be made tight with Portland cement. Y branches shall be provided at frequent intervals for house connections and be securely capped and made water tight and whenever connections with the public sewers are made it shall be by special permit and under the inspection of some borough officer who shall be appointed to supervise and direct the work and the sewer system. Inspection manholes shall be constructed at all street intersections and at changes in line and grade of the sewers.

THIRD: The sizes of the sewers shall be reduced in diameter and at the close of each season's work detail plans of the sewers laid during the season, together with any other information in connection with the same and called for, shall be filed with the State Department of Health.

FOURTH: This permit to discharge sewage into the waters of the State is issued under the express stipulation that the borough shall prepare plans for a sewage disposal plant and submit the same, together with a report, to the Commissioner of Health for approval on or before the first day of December, nineteen hundred and seven. If this be done, the Commissioner of Health will fix a time when such sewage disposal works as may be approved shall be constructed and put in operation, during which time the sewage of the borough may be temporarily discharged into the waters of the State, but if said plans be not submitted on or before said December first, in good faith, then the borough will have forfeited its right to discharge sewage temporarily into such waters.

FIFTH: If at any time in the opinion of the Commissioner of Health the sewer system or any part thereof shall have become a nuisance or public menace, then the borough shall adopt such remedial measures as the Commissioner of Health may advise or approve.

SIXTH: No pathological material from any laboratory shall be discharged into the system. The proper authorities shall cause these wastes to be destroyed on the premises.

SEVENTH: The public authorities shall endeavor to secure an abandonment of all surface privies and cess-pools, a discontinuance of the discharge of kitchen drainage and sewage into street gutters and water courses in the borough and a general connection of occupied estates where the same are on the line of a sewer.

EIGHTH: This permit is also issued under the express stipulation that that part of the sewer system to be provided for the section of the borough west of the railroad shall be immediately constructed under the terms of this permit, and that the sewage from the brewery, roundhouses and all buildings in the district shall be intercepted.

Cresson Water Company will be notified to maintain the fence around the reservoir and to protect its source of supply from all pollution. The Pennsylvania Railroad Company will be notified and requested to remove the obstructions in the culvert under its main line near the turnpike and to keep said culvert clear. The Cresson Brewery Company and Pennsylvania Railroad Company will be notified that some other method of disposal must be forthwith adopted for the disposal of sewage from their properties than into Clearfield Creek.

The borough council of Sankertown will be notified that a sewer system for that borough is desired and that the Department stands ready to assist the project and to bring about, if practicable, a joint sewerage and sewage disposal system for both boroughs, and for the purpose of discussing the matter a hearing will be given at some date in the near future agreeable to all parties concerned; but in any event, the disposal of sewage from existing sewers in Sankertown into any of the waters of the State must cease, more especially since such discharge defiles the ice supply along said creek below the borough, which supply is widely distributed to the public in the State.

Harrisburg, Pa., August 16th, 1907.

DERRY, WESTMORELAND COUNTY.

This application was made by the borough of Derry, and is for permission to install a sewer system.

It appears that the borough of Derry, Westmoreland County, is on the main line of the Pennsylvania Railroad, about six miles east of Latrobe. It is on the northern slope of the Chestnut Ridge Mountains and drains into McGee Run which empties into Conemaugh River just above Blairsville. At the present time the borough has an approximate population of three thousand within its limits and there are about one thousand more residing in Derry Township on the outskirts of the borough.

It is a railroad town and freight division point of the Pennsylvania system. The yards, engine house and offices of the division are in the borough. The railroad employs about five hundred men, the American Window Glass Company, which has sand works here, employs over one hundred men and the Sevres China Company employs about two hundred men.

The sewage from the sand works plant, which is in the upper part of the borough, and the sewage from the Pennsylvania Railroad properties are discharged into the same natural water course which passes down through the borough.

There are no public sewers in Derry. There are about two hundred small private sewers which empty into the two runs in the borough. Probably two thousand people use privies of the shallower type. These privies are almost universally overflowing. It is estimated that there are thirty-five loose-walled cess-pools in the town, some of which have overflow to the natural water courses. Rain water, and in some cases sink water, discharged by pipe into the privies, frequently washes the contents to a greater or less extent out on the alleys and gutters in the streets. The street gutters are generally in a foul condition and the streams in the borough are badly polluted. From a sanitary standpoint, so far as sewage is concerned, the borough is ripe for an epidemic. The one saving feature is that the water supply comes from mountain streams immediately above the borough on the same drainage slope. The water is impounded in reservoirs which thus cut off the natural flow of the streams, which otherwise would come down and hasten the removal of deposits in the water courses within the borough limits. As it is, when rain falls occur, torrents sweep down the mountain sides and materially aid in cleansing the borough territory. The Pennsylvania Railroad has a twenty-four

inch sewer into the run. This pipe receives the sewage from its own properties, drainage from the round house and also sewage from private sewers. In this manner between three and four hundred people are served.

The employees at the sand washing works use privies which are located on the banks of the stream. In nineteen hundred and six, certain citizens of Derry Borough entered complaint with the State Health Department against Derry Land Company, alleging that said company was discharging sewage into a run above the borough, thereby causing a nuisance to the property owners along the run in the borough, and a menace to the general public health.

The Derry Land Company laid out a certain tract of land adjacent to the northwest corner of the borough in Derry Township, and built thereon over a score of dwellings and a hotel, paved streets, curbed gutters and sewered these streets with pipes designed to remove both sewage and storm water. In this vicinity, outside of the borough, is the Sevres China Company plant which employs two hundred hands. The sewage from this plant goes into a small run which flows down through the borough in a northeasterly direction. About four hundred feet below the point in the run where the sewage from said plant is discharged, the sewage from the Derry Land Company is discharged into the run, not through a pipe, however, but through an open ditch. The point where this sewage enters the run is at or near the borough line. From here, through the municipal territory, the run is an open ditch easterly to Third Street, a distance of about eight hundred feet, where it joins another small open run, whence the course of the stream is out of the highways across private property to the main stream called McGee Run. The whole course of the run, from the borough line, where the said land company's sewage is discharged, to the borough line, at the lower end of the run, is a distance of about two thousand feet. Numerous private sewers empty into this water course in the borough.

In the summer of nineteen hundred and six, there were about two hundred residents on the Derry Land Company's tract and additional houses were under construction. Undoubtedly, this tract and also that occupied by the Sevres China Company will in time be added to the borough territory, and it seemed fitting to the Department that the local authorities should grapple with the problem of sewage disposal for all the territory.

On August twenty-third, nineteen hundred and six, the following communication was sent to the president and members of the borough council:

"This is to notify you that the pollution of the natural water courses within the borough limits of Derry, and near the borough limits in Derry Township, has become a public menace. In compliance with an application and complaint, both of which have been duly made to the Commissioner of Health, I have been obliged to make an investigation, and to take cognizance of the conditions in the stream within the limits of your borough and to consider means for the removal and abatement of the menaces. Because those menaces are so numerous it would work a great hardship and be much more expensive for the individual violators of the law to remedy the evils and to remove the menaces individually than for a co-operative plan to be put in force by the borough under some plan of assessment which would apportion the cost equitably. Therefore, I urge you to give the question of a sewerage system for the borough your early and careful consideration. Because the borough is limited in the amount of money it can borrow and as there are other public needs besides sewerage, economy and efficiency demand that a sanitary sewer system be devised, the sewers of which need be only large enough to remove sewage proper. Such a system can be built and the sewage properly treated at a cost which will leave a considerable sum of money inside of the debt limit for the borough to expend for other purposes. I shall be very glad to co-operate with you in working at the plans of such a sewer system.

I am,
Yours very truly,
SAMUEL G. DIXON."

To the Derry Land Company, Sevres China Company, American Window Glass Company and the Pennsylvania Railroad Company the following communication was sent on even date:

"On complaint and petition duly made to me I have had an investigation made and determined that it has become necessary for you to find some other way of disposal of sewage than the one now used by you into the natural water courses in or adjacent to the borough of Derry, Westmoreland County, Pa.

By this mail I am communicating with the borough council and offering my co-operation towards the adoption of a sewerage system for the entire borough. I shall be glad to render any advice or assistance in my power to the end that the pollution of the natural water courses shall cease and the improved sanitary conditions shall be brought about in the borough.

Yours very truly,
SAMUEL G. DIXON."

The proposed sewer system is to take sewage and roof drainage, and its outlet is to be into McGee Run at a point outside of the borough limits and approximately three-fourths of a mile from the centre of the town. The outlet sewer is to be thirty inches in diameter and the smallest sewer eight inches in diameter. The total length of all of the sewers is about seven miles, to be distributed in different sizes as follows: Six thousand one hundred and fifty feet of eight inch pipe, nine thousand feet of ten inch pipe, twelve thousand one hundred and fifty of twelve inch, three thousand nine hundred of fifteen inch, one thousand one hundred of eighteen inch and three thousand four hundred and fifty of thirty inch. The grades are to be one per cent. or over and in some cases as high as six per cent.

To construct these sewers with proper manholes and appurtenances will cost in the neighborhood of sixty thousand dollars.

The sizes proposed, however, are entirely too big. The future of the town depends entirely upon the railroad. If the Pennsylvania Railroad Company's yards and buildings should be removed, there would be a marked diminution in population in the town. However, for a sewer design it would not be wise to estimate less than a population of eight thousand people, which is double that in the borough and immediate vicinity at the present time. With an outlet of twelve inches in diameter, which is ample on the grade available, and substituting eight inch pipe for the other sizes, the system could be built at the same unit price for a cost of thirty-eight thousand dollars. Therefore, by the substitution of the smaller for the larger sizes, twenty-four thousand dollars would be saved.

It is proposed to discharge the sewage into McGee Run one-quarter of a mile below the borough limits. The drainage area is approximately five square miles and the dry weather flow is in the neighborhood of three hundred thousand gallons, or too little to sufficiently dilute the sewage to prevent a nuisance. Because the drainage area of McGee Run, at the point where it empties into the Conemaugh River, is approximately thirty square miles only and the dry weather yield is probably less than one and one-half million gallons per day, sewage could not be turned into the run at any point between its mouth and the borough without producing a nuisance were the banks of the stream to become occupied at any time, or the waters used for any purpose. McGee Run is eight miles long and is largely through pasture land. The waters do not receive mine drainage. In a county where the majority of the water courses receive the acid drainage of mines, which kills fish and renders the water unpotable, a pure stream of water must be a very material asset in the valuation of farming land, and since this is one of the few streams in this section of Pennsylvania which do not receive mine drainage, very good reasons should be required in support of any plan whereby the purity of the stream is to be destroyed.

The following boroughs and cities take their water supply from the Allegheny river, all of which are within sixty-six miles of Derry, the nearest place being forty-three miles distant only: Freeport borough, with a population of seventeen hundred, forty-three miles below Derry; Tarentum borough, population fifty-five hundred, fifty miles below; Pennsylvania Water Company, population forty thousand, sixty-three miles below; Allegheny City, population one hundred and thirty thousand, sixty-three miles below, and Pittsburg, population three hundred and twenty thousand, sixty-six miles below Derry.

During freshets the sewage from Derry would be carried down by the currents of the streams to these water works intakes in a few hours. At present the sewage constitutes one of the many contributing causes to the high rates of water borne diseases in the Pittsburg district. In the interests of public health, sewage pollution of these waters must cease and the only known way to stop the pollution of these water supplies is by treating the sewage of the towns above before it goes into the waters of the State.

The petitioners do not show wherein public necessity demands that McGee Run shall be turned into an open sewer. The Conemaugh river is an acid stream made so by the mine drainage. It would cost sixty thousand dollars, or thereabouts, to build a sewer from Derry to the river. A sewage disposal plant could be built for less money. The sewer system and disposal plant can be built should the abuttors assume say two-thirds of the cost of the sewers so that the total cost of the project to the borough would not exceed thirty thousand dollars.

Derry has not at the present time a bonded indebtedness, so the Department is informed. If the valuation is as reported, about six hundred thousand dollars, then the borough can assume a debt of forty-two thousand dollars without exceeding the constitutional limit.

It has been unanimously agreed that the interests of the public health require that a permit be granted and it is hereby and herein granted to the borough of Derry to install a system of sewers, under the following conditions and stipulations:

FIRST: That the present plans be modified to exclude all roof and surface water.

SECOND: That before approval of the sewer system is given by the State Health Department detail plans and profiled of the sewers to take house drainage only shall be prepared by a competent engineer; also plans for an efficient, up-to-date, sewerage disposal plant for the purification of the sewage of said sewer system, which plans shall be submitted to the State Department of Health for approval.

THIRD: That after the plans for the disposal plant shall have been modified, amended or approved by the State Department of Health, the date on or before which they shall be constructed shall be fixed by the Commissioner of Health, which date shall not be less than two years, or more than five years, from the date when the borough's sewer system, or any part thereof, shall have been built or put in use.

FOURTH: No pathological material from any laboratory shall be permitted to discharge into the system. The proper authorities shall cause these wastes to be incinerated on the premises.

Harrisburg, Pa., April 29, 1907.

DUNMORE, LACKAWANNA COUNTY.

This application was made by the borough of Dunmore, Lackawanna county, and is for permission to extend its sewer system and to discharge the sewage therefrom through the sewers of the city of Scranton into the Lackawanna river within the limits of said city or into natural water courses within the limits of said borough.

It appears that the borough of Dunmore is really a part of the community bearing the name of the city of Scranton. There are no visible signs on the ground to enable one to distinguish where the principal lines of one corporation ends and the others begin. For all practical purposes, the problems of water supply and drainage are the problems of one community. Within the corporate territory of Dunmore borough there is at present a population of about fifteen thousand people. In the year one thousand nine hundred the census gave the total of twelve thousand five hundred and eighty-three. The town is largely residential, its citizens being engaged in Scranton or employed in the mills and shops of that city. However, within the borough limits there are five coal mines in operation and the repair shops of the Erie Railroad, the Dunmore Iron and Steel Company Machine Shops, the Scranton Stove Works and three silk mills.

The topography of the borough territory is such that all of the surface drainage therefrom must and does pass down through natural water courses, improved, or otherwise to the Lackawanna river which courses extend through the city of Scranton, or that part of it lying east of said river. This refers particularly to the built up part of Dunmore. In the northern and eastern portions thereof the territory is mountainous, rugged and practically uninhabited. The eastern portion and a small part of the built up section of the borough in the vicinity of the railroad repair shops and the Dunmore Iron and Coal Company's plant drains into the Roaring Brook which also passes down through the city of Scranton to the Lackawanna river.

The water supply of Dunmore is furnished by gravity from a reservoir in the east part of the borough in Little Roaring Brook by the Dunmore Water Company, owned and operated by the Scranton Gas and Water Company, and also by water obtained from reservoirs on Roaring Brook owned and operated by said gas and water company. The built up portion of the town is quite well supplied with the public water and it is reported, as is usually the fact in fields where coal operations are active, that few private wells or springs exist there.

At the present time there are three public sewer outlets in the borough. One of them is into Roaring Brook and the other two lead into sewers belonging to the city of Scranton. Roaring Brook sewer outlet is thirty inches in diameter and discharges into the stream within the borough limits and at a point one thousand feet above the city line. Three coal breakers and two washeries are drained naturally into Roaring Brook above said sewer outlet. This sewer was constructed in the year one thousand eight hundred and eighty-nine and serves twenty-four hundred feet of street sewers, the smallest being twenty-four inches in diameter. The lower part of it is in the property of the Dunmore Iron and Coal Company whose buildings and the Erie railroad shops are connected with it. At least one thousand people use this system during the working hours of the day.

About the year one thousand eight hundred and ninety-one, the first sewer district in the borough was established in the central western part thereof, adjacent to the city of Scranton and at that time a district sewer system was constructed and the thirty inch sewer outlet thereof connected to the city of Scranton sewer in Green Ridge street. The consideration paid to the city of Scranton for this privilege is reported to have been sixteen hundred dollars for

which the surface drainage and sewage from the district comprising a tract of land about two thousand feet wide and fourteen hundred feet deep, was to be emptied into the said city sewer. The system comprises eighty-three hundred feet, of which two hundred feet are thirty inch, four hundred feet of twenty-four inch, four hundred feet of twenty inch, four hundred feet of fifteen inch, our thousand feet of twelve inch, and twenty-nine hundred feet ten inches in diameter.

In the main or second sewer district there is a deep ravine down which a natural water course existed formerly, the waters of which were confined within the city limits to a large stone arch culvert. When the city arched over this ravine within its limits, the valley was filled up and to-day there is no surface indication of a natural water course ever having been there. Subsequently it was discovered that the size of this structure was insufficient to remove the large volumes of water delivered into it from the precipitous and extended drainage area above in the borough of Dunmore. Consequently the city built a relief sewer from the point where the ravine enters the city down Poplar street to Lackawanna river. In the year one thousand nine hundred and four the borough built a large trunk sewer in the ravine varying in diameter from six by nine feet to five by eight feet, terminating at the Erie Railroad at the head of the ravine. At that time the borough also constructed a combined sewer in Blakely street, a distance of four thousand feet, the diameters ranging from twelve inches at the summit to four by six feet at the trunk sewer. Also thirty-five hundred feet of combined sewer in East Drinker street. The diameters ranging from three by five feet to eighteen inches. Also twelve hundred feet of twenty, twelve and ten inch combined sewer in Shoemaker avenue and Chestnut street. These intercepting sewers traversed the built up part of the town and were a part of a comprehensive plan taken together with the other sewer outlet districts, for adequate sewerage for the borough, except the outlying districts. Breaker number five and the one owned by the Green Ridge Coal Company now discharge their mine drainage into the main trunk sewer. It is reported that the Pennsylvania Coal Company which operates all the mines in the borough, excepting the Green Ridge mine, is constructing a tunnel from the Lackawanna river through the northern part of Scranton and Dunmore borough for the purposes of obviating mine drainage pumping, substituting therefore this gravity tunnel. When this improvement is completed, the drainage of the mines will be diverted from Roaring Brook and the Dunmore trunk sewer through the tunnel directly to the river. Probably the washeries will also be likewise drained.

There is a private sewer in district number two, adjacent to district number one, leading from the Scranton Stove Works down New York street to a city of Scranton sewer. It is twelve inches in diameter and has a ten inch connection to it in Jefferson avenue. The total length is fifteen hundred feet.

The petitioners represent that general sewer extensions in the borough have long been desired, that complaints relative to nuisances caused by overflowing privy vaults, which are mere holes in the ground, and from stagnant water in street gutters and overflowing and freezing water from kitchen drainage in cold weather, have been too numerous for the borough authorities to adequately remedy, and that to comply with the recommendations of the local Board of Health, a general sewerage system was demanded. Besides, bath tubs and modern sanitary facilities are desired by many of the less resourceful class. Doubtless an awakened sentiment relative to personal hygiene as well as public sanitation, may with reason be attributed to the lesson taught by the recent typhoid epidemic in Scranton, during which a rigid cleaning up of private properties was enforced in that city, and also in Dunmore.

The proposed extensions comprise the carrying out of the original comprehensive plan. The system will continue to be combined as are the sewers in Scranton into which the Dunmore sewers empty. To the Roaring Brook outlet system is to be added thirteen thousand four hundred and fifty feet, of which thirty-three per cent. will be ten inches in diameter, thirty per cent. twelve inches in diameter, twenty-two per cent. fifteen inches in diameter and fifteen per cent. eighteen inches in diameter. Probably twenty-five hundred people is the maximum which will ever be served by this district, or two and one-half times the number now served.

In the first district, strictly the third district, the additions contemplate a little over a mile, comprising eleven hundred feet of twenty-four inch, eight hundred feet of eighteen inch, one hundred feet of fifteen inch, nine hundred and fifty feet of twelve inch and three thousand and sixty-five feet of ten inch sewer, all of whose flow during dry weather is to become a part of the flow delivered by the outlet in Green Ridge street into the city of Scranton sewer. However, the plan further provides a thirty inch storm overflow from the end of the twenty-four inch pipe in Electric street at Jefferson northerly into a ravine and natural water course, which comes down from the hills to the east, draining the cemeteries. A twelve inch pipe from the said street intersection, is to convey the dry weather flow to the Green Ridge outlet sewer, and the storm overflow from said intersection is to convey the surplus mingled sewage and storm water

to the said water course which is an open channel down through the built up part of the city of Scranton in the district known as Green Ridge. This city district is well sewered and sewers are in streets extending up to Dunmore borough line or near it.

The Scranton Stove Works sewer is incorporated into the proposed plan. The district which it serves is not to be enlarged, but the borough is to assume the operation and maintenance of it thereafter.

The extensions in the second district are principally those of lateral street sewers. Below Breaker number five and passing under a large culm bank there is a natural water course covered over by a stone culvert, and thoroughly confined in a well built masonry structure about four feet square. Permission has been obtained of the owners to incorporate this in the borough sewer system. The water now flows into the borough's trunk sewer through an open channel which is to be abandoned, and in its place is to be substituted a thirty inch pipe. All told, when completed the sewer extension in district number two will total eleven and three-tenth miles, in district number four two and six-tenths miles; in district number one, one and one-tenth miles, and the private sewers incorporated three-tenths miles or a total of fifteen and three-tenths miles. There are at the present time four and five-tenths miles of existing public sewers, so that the completed system will comprise a total of twenty miles in round numbers.

Owing to the declivity of the borough's territory no difficulty is encountered in obtaining ample self-cleansing velocities in the sewers. Manholes are to be built at all street intersections. Ventilation is to be effected through perforated manhole covers, all house connections and street catch basins are to be trapped, and the sizes of the pipe seem to be ample to care for all ordinary rainfalls. If experience should prove that particular sewers are inadequate in size to prevent back-flooding of properties, then remedies can be applied and it is to be believed that this expedient should be adopted, rather than an attempt to critically alter the proposed designs and capacities from a theoretical standpoint. These remedies, if they are needed therefore, are left to the local authorities to work out in experience.

Undoubtedly sewers are needed in Dunmore and the benefits will accrue to Scranton as well as Dunmore since at present some of the kitchen drainage is washed into natural water courses which flow down through the city. That part of the design providing for a storm overflow into the run below the cemeteries is questionable, and it does not appear why this overflow is necessary. If the Green Ridge city sewer is not capable of receiving the entire flow of district number one then some of such flow can be diverted into other city sewers in the vicinity, and in this manner the pollution of said run at any time thus obviated.

It appears that Roaring Brook has received the sewage of district number four outlet for a number of years together with mine drainage and washeries waste, and the Department is not informed that such disposal has been made the subject of any complaint. This run receives the discharges of at least one sewer within the city limits. If, however, objections should be made by said city or by any riparian owners on Roaring Brook to the discharge of Dunmore sewage from district number four into said run, then some other method of disposal would have to be provided for by said borough.

It is reported that the assessed valuation of Dunmore is in the neighborhood of three million dollars, which, if true, admits of a bonded debt of two hundred and ten thousand dollars. Since there is a present bonded indebtedness of fifty-six thousand dollars reported, there still remains one hundred and fifty-four thousand dollars in round numbers available for public works. The fifty-six thousand dollars includes twenty thousand dollars appropriated for sewers and unexpended. A considerable portion of the cost of the proposed sewers is to be assessed on abutting estates. Therefore, Dunmore borough is very well off financially and amply able to undertake the cost of the diversion of sewage from Roaring Brook, if this be found essential.

The right of the borough to sewer into the improved natural water course outlet of sewer district number two is assumed to be prescriptive, the borough never having paid money to the city of Scranton for the privilege. In fact it is obligatory upon said city to maintain an adequate water way there for the removal of storm water. The proposed lateral sewer extensions of eleven and three-tenths miles in the second district approximates twenty-two thousand feet of ten inch, twenty-five thousand feet of twelve inch, four thousand feet of fifteen inch, three thousand feet of eighteen inch, two thousand feet of twenty inch, three thousand feet of twenty-four inch, twelve hundred feet of thirty inch and four hundred and fifty-four feet of thirty-two inch storm drains, all it appears in the watershed naturally and now drains into the main trunk sewer outlet. The use of these conduits as carriers of house sewage is incidental only, their capacities being determined by the volume of storm water they are to remove. The question of whether the delivery of this water from the entire water shed, through underground pipes at the city line into the city drain, will be in a shorter period of time than were the water to flow over the

surface of the ground, and thus materially to add to the service of the city sewer, has not been considered by the Department. Approval of the borough plan contemplates the adjustment between the municipalities of such matters should they arise.

Application for approval of sewer extensions in the city of Scranton is now before the Commissioner of Health for consideration, and any stipulations or requirements relative to the disposal of sewage must necessarily concern the borough of Dunmore, unless, of course, the city of Scranton is liable for the costs and expenses of taking care of all of the sewage which Dunmore may empty into the Scranton sewer.

Finally Roaring Brook through Dunmore borough below the reservoir of the Scranton Gas and Water Company is a dry bed in the summer time, or would be if it were not for the mine drainage discharged into it. This flow being extremely acid operates as a disinfectant and neutralizes to some extent the sewage now discharged into the brook by district number four outlet. However, when the mine drainage, etc., shall have been diverted from this brook through the hereinbefore mentioned tunnel, then the only flow in the brook in dry weather will be practically crude sewage and a nuisance will result there and within the city limits. Some complications might arise relative to the diversion of surface drainage from district number four into the main trunk sewer of the borough and hence to the Lackawanna river. This is possible and feasible so far as grades are concerned. A better design and cheaper would be to plan for all surface drainage to continue to go into Roaring Brook where it belongs and to make the proposed sewer system sanitary only and connect it to the second district sewer outlet. Some modification of the proposed plan is desirable. The State would not under the circumstances care to issue a permit for the discharge of sewage into Roaring Brook unless the borough had first obtained waivers of damages or complaints from all riparian owners along the brook below the sewer outlet, and also the consent of the city of Scranton.

It has been determined that the interests of the public health demand that a permit be granted and it is hereby and herein granted to the borough of Dunmore for the construction and extension of its sewer system under the following conditions and stipulations:

FIRST: That all stipulations and conditions which may be made by the Commissioner of Health in any permit issued by said Commissioner to the city of Scranton relative to sewage disposal shall obtain within the borough of Dunmore in so far as said stipulations and conditions may be relevant to the use of the city of Scranton's sewers by the said borough of Dunmore.

SECOND: At the close of each season's work the borough shall prepare plans of the sewers and their appurtenances built during the year and file the same, together with any further information that may be required in the State Department of Health.

THIRD: If at any time in the opinion of the Commissioner of Health the sewer system or any part thereof has become a menace or nuisance to public health, then the borough shall adopt such remedial measures as the Commissioner of Health may advise or approve.

FOURTH: The approval of the plans given is contingent that further conditions under which the borough of Dunmore shall use the sewers of the city of Scranton shall be amicably determined by the said municipalities, otherwise plans for disposal of the borough's sewage shall be submitted to the Commissioner of Health for approval.

FIFTH: No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

SIXTH: With respect to the sewers of the fourth sewer district approval is withheld for the present until the plans shall have been modified to comprise a strictly sanitary sewer system with an outlet either into the second sewer district, or into some sewer of the city of Scranton, or to some sewage purification plant. Before any sewer extensions are made in this district, such modified sewer plans shall be submitted to the Commissioner of Health for approval.

SEVENTH: The outlet of the Fourth street sewer district may continue as now to discharge sewage into Roaring Brook, until sanitary sewer outlet for said district shall be provided or until mine drainage shall have been wholly or largely diverted from Roaring Brook, whereupon the borough shall discontinue such sewage discharge.

EIGHTH: With respect to the storm overflow from the third sewer district proposed, approval is withheld and the plans are to be modified by the borough to obviate the discharge of sewage at any time into any other conduit than a sewer belonging to the city of Scranton or leading to a sewer belonging to the said city, provided, however, that the borough may, if it so elects, prepare plans and submit them for approval for a sewer outlet from Dunmore borough through the city of Scranton to the Lackawanna river.

The borough council should be advised that when the problem of sewage treatment for Scranton and hence Dunmore, is taken up, which may possibly be much sooner than is anticipated, the economies of the case may dictate that a separation of sewage from storm water should be effected. It would be much cheaper and probably better for the borough of Dunmore to adopt the separate system for all of its sewer extensions. Thus house drainage for domestic waste could be provided in all the streets at a relatively small sum and storm drains could be built from time to time, in the few streets requiring underground removal of storm water. If the borough elects to take in both sewage and storm water now, it should be with the clear understanding that small conduits for sewage may some day be necessary. This general statement does not relate to the specific requirements of the permit.

Harrisburg, Pa., July 19th, 1907.

EAST MAUCH CHUNK, CARBON COUNTY.

This application was made by the borough of East Mauch Chunk, Carbon county, and is for permission to install a system of sewerage and sewage disposal and to discharge the effluent therefrom into the Lehigh river within the limits of said borough.

It appears that the boroughs of Mauch Chunk and East Mauch Chunk are located on either side of the Lehigh river where it breaks through the Mahoning mountains. Mauch Chunk is famous for being the place at which "Stone Coal" was discovered in one thousand eight hundred and four, and from whence the first regular shipment of anthracite coal was made in one thousand eight hundred and twenty to Philadelphia by the Lehigh Coal and Navigation Company. The canal began at Mauch Chunk and gave the place a position of importance in the opening up of the anthracite coal regions of the Lehigh basin. Here also was constructed in one thousand eight hundred and twenty-seven, the second railway in the United States. By it loaded cars descended by gravity from the mines of Mount Pisgah to the canal and were hauled up by mules. The canal is still in active operation. The dam across the Lehigh river is in the upper part of both boroughs and the canal extends down stream from it along the east bank in East Mauch Chunk borough.

The mountain ranges here are nearly due east and west across the course of the river which, while tortuous, is in a generally southerly direction. The southerly boundary of Mauch Chunk lies at the summit of the Mauch Chunk mountain range. This range east of the river in East Mauch Chunk is known as Pocono mountains. The northerly boundary of the boroughs is Sharp mountain, also known as Pisgah mountain. The next ridge northerly is known as Broad mountain. In the valley between Broad and Pisgah mountains from the west flows Nesquehoning creek. This stream receives large quantities of mine drainage and in consequence is extremely acid. It enters the river about a mile and a half above the dam at East Mauch Chunk.

Coming down from the west in the valley between Pisgah mountain and Mauch Chunk is Mauch Chunk creek, entering the river in the borough. This stream is not acid, the coal measures running out on the northern slope of Pisgah mountain. In consequence the pollutions of the Lehigh river by coal mine drainage and refuse occurs on the water shed above the Mauch Chunk dam. Coal is not found and mined anywhere east of the river in sufficient quantities to be mentioned.

East Mauch Chunk borough was incorporated in the sixties. In one thousand eight hundred and seventy the population was fifteen hundred; in one thousand eight hundred and eighty, two thousand; in one thousand eight hundred and ninety, twenty-two hundred and seventy-two; in nineteen hundred, three thousand four hundred and fifty-eight; and at the present time it is estimated to be three thousand eight hundred. Owing to the precipitous topography of the site of Mauch Chunk borough, many of the business citizens of this place reside in East Mauch Chunk. The topographical advantages of the latter place account for its growth. Besides the employments afforded by coal mining and allied interests, there are two local manufactories, one a silk mill, employing about two hundred hands, and a brewery.

While the corporate territory of East Mauch Chunk borough is quite extensive, the built up portion lies along and north of Ruddles Run, a stream rising in the Pocono mountains, as does a second stream known as Robinson's Run, which forms the northerly boundary of the borough and the built up part. These streams are each about two and a half miles long, drain wooded areas and descend in the neighborhood of seven hundred feet from the summits of the water shed to the river. Between them is a ridge gradually sloping to the river on which the dwellings of the borough are located. The silk mill and a few houses are located in the valley of Ruddles Run, south of it. Surface drainage, therefore, is excellent. Ruddles Run is enclosed in a culvert covered over, about ten feet wide, and five or six feet high, from the silk mill, a distance of

about a half a mile to the canal into which it empties. The drainage from the silk mill and from the other buildings in the vicinity is discharged into the arched portion of the run.

With hardly an exception the townspeople use the public water supply which comes from the upper water shed of Ruddles Run, in which there are springs, flowing artificial wells, an intake dam and two small storage reservoirs for the collection of surface waters. About two of the three square miles of water shed are reported to be owned by the Mauch Chunk Water Company.

About twenty people permanently reside on the drainage area. Besides, on the mountain there is a hotel known as "Pocono Cliff House." The petitioners represent that the efforts of the local authorities to provide preventive measures will not assure the town against an epidemic unless the State enforce regulations with respect to the disposal of sewage at the hotel and the four dwelling houses on the water shed. The hotel privy rests on the surface of the ground from which fecal matter may be washed down the steep incline into the ravine at a point possibly one-half mile above the intake dam of the water works. Drainage from the barn also flows directly into the same ravine.

On Frank Eckert's property there is a surface privy located about fifty feet from a small ravine leading to the main stream and the intake dam, similarly constructed and drained and on George Linedecker's property adjoining, there is a barn twenty feet from the ravine and stream. No provision is made on this property for disposal of sewage. It is reported that all household wastes are thrown out on the ground on the edge of the ravine. On Fred Ketner's land there is a privy without a vault about one hundred feet from the stream which enters the upper reservoir. The kitchen slops are thrown on the ground near the house. The members of the family do laundry work and bathe at a spring on the north side of the reservoir near the house. A cake of soap, towels and some wearing apparel were seen at the spring on the day of the inspection by the Department's officer.

The drainage from George Meyer's is into the stream just above the intake dam. The drainage from a surface privy, barn and chicken yard is down a steep slope to the run.

The upper reservoir is less than a half mile above the intake dam and the middle reservoir is immediately below the upper reservoir. The latter basin is formed by a masonry dam across the run, length about one hundred and forty feet, by means of which the water is backed up stream about two hundred feet. The greatest depth is about eight feet and the storage capacity in the neighborhood of eight hundred and fifty thousand gallons. Two eight inch blow-offs are provided for drainage purposes at the dam. A six inch gravity main extends from this reservoir down the valley to the town or the higher portion of it east of Sixth street. The middle reservoir is connected with this pipe also. It also is constructed by a cement dam, is provided with a ten inch blow-off, holds about two hundred and fifty thousand gallons and has a maximum depth of about eight feet.

The intake dam is an earth structure, except the spillway and a short distance either side of it where the construction is masonry. The water here at its deepest point is about ten feet deep and at the sides and upper end the water is shallow. The storage capacity of this basin is about five hundred and thirty-five thousand gallons. From it a six inch gravity main conveys water to the lower parts of East Mauch Chunk borough. By an arrangement of gates the borough can be entirely supplied from the two upper reservoirs, but the lower reservoir, owing to its elevation, can only furnish the town within the low level district.

Evidence in abundance, consisting of quantities of leaves, dark green scum and other deposits, may be seen on inspection at the reservoirs at any time, and it is reported by local authorities that during the summer time when the flow of the stream is small and the consumption of water in the town large, the draft on the storage capacity is such, that the surface of the water in the reservoir is lowered six feet or more, and that at such times the accumulated vegetable matter on the shores and bottom of the basin is exposed to the air and sunlight and in consequence decomposes, creating offensive odors at the reservoirs and also imparting them and a disagreeable taste to the waters. The reservoirs should be thoroughly cleaned out. Mauch Chunk is connected by a highway bridge spanning the river with East Mauch Chunk. The structure is at the foot of South street in the latter borough, which street extends back up the ridge at right angles to the river and is the southerly highway of the village. Centre street parallels it and is next north, then comes North street, Lehigh and Pine streets. The latter is the most northerly street in the village, and is near the stream in the ravine which is tributary to Robinson's Run. At right angles to these east and west thoroughfares are the streets designated by numbers beginning with Front street (along the banks of the river and on the bluff seventy-five feet or so higher than the canal) and including Eleventh street. The elevation at Eleventh street is seven hundred and fifty. Front street is about five hundred and forty. In Fifth street from Centre southerly, there is a private combined sewer twenty inches in diameter which runs out onto the

surface of the ground south of South street in the vicinity of dwellings, at which point the sewage is discharged over the edge of a bluff into Ruddles Run ravine. This main sewer receives laterals east and west in Centre and South streets and in Fern alley between these streets. In all there are said to be sixty-five buildings connected with these private sewers. The original sewer was constructed by parties for purposes of surface and under soil drainage. Since then other property owners have been granted permission to connect by payment of an entrance fee to the original owners. At the point of discharge a nuisance is created which has been the subject of neighborhood complaints. House sewage, roof and cellar water and street drainage is taken into this system. Elsewhere in the borough surface drainage is provided for in street and alley gutters. It is reported that no regulation as to privy vaults and cesspools has been enforced in the town. Ordinary privies placed over dug vaults are the rule for the disposal of excrement, and in most of such cases kitchen waste and wash water is drained to the street gutters. Where there are bath tubs and water closets in the building, generally speaking, percolating cesspools have been attempted. The number of these in the town is not known, but they are said to be quite numerous. Part of the town is located on soil of a clay formation, where cesspools fill up and overflow creating a menace to public health. It is to obviate this general unhealthy condition and to afford means for the abatement of the Fifth street sewer outlet nuisance, that the public sewerage system is proposed.

The plans submitted for consideration comprises a system of sanitary sewers whose sizes range from eight to twelve inches in diameter, there being eighteen thousand feet of eight inch, seventeen hundred feet of ten inch, and three thousand feet of twelve inch proposed. The grades are naturally steep and hence will be self cleansing. Ventilation is to be secured through ventilated manhole covers, which manholes are to be located at street intersections and at changes of grade, and further ventilation is effected through the main house drain which is to be untrapped and carried up above the roof of the building. Whatever flushing may be necessary is to be accomplished by hand at the manholes and is to be made apparent by inspection. Ordinary bell and spigot terra cotta pipe is to be used and the joints are to be made with American cement termed in the specifications "Rosendale."

In the sewer districts, which comprise practically all of the village, there is in the neighborhood of one thousand possible sewer connections. It is expected that possibly two hundred connections will be made with the sewer system during the first year.

The plan provides for the conveyance of the sewage by gravity to the valley of Robinson's Run in the northwest corner of the town just north of the junction of Front and Lehigh streets where the disposal plant is to be located. That part of the borough in the valley of Ruddles Run is too low to be sewered by gravity into the proposed system. Here is a silk mill and a dozen houses or so. If the district grows in the future and sewers are provided there, the sewage must be pumped therefrom up into the high level sewers now proposed. As previously stated the mill and these buildings are now drained into Ruddles Run culvert and the pollutions reach the canal.

It is proposed to treat the sewage in septic tanks and a sprinkling filter to be located south of Robinson's Run in the ravine at the foot of a bluff just north of Lehigh street. On this bluff facing the street there are houses overlooking the streets and the ravine. There is room in this ravine for additional filter and septic tank units. It appears to be the only available site for a sanitary plant in the town. It is within four hundred feet of dwellings so that careful maintenance is requisite to prevent a nuisance being created.

The plans show two uncovered septic tanks each one hundred and ten feet long by twenty-five feet wide by eight feet deep, and one sprinkling filter one hundred and five feet square and six feet deep. The works are designed to treat six hundred and twenty-five thousand gallons daily. For the treatment of the sewage for the next three or four years, but one tank will be provided and one-half the filtering area above mentioned. The operation of the plant is to be continuous.

The septic tanks are to be built of concrete, bottom and sides, and to be set side by side. The sewers are to terminate in an open gate chamber, eight feet square, provided with a by-pass to Robinson's Run. From this chamber the sewage is to pass either through an opening leading to an inlet chamber extending across the entire width but outside of the end of septic tank number one or through a similar opening into a similar chamber at tank number two. Through the end walls of each tank three twelve inch pipes spaced equal distances will admit sewage from the inlet chambers to the tanks. Thus by the opening or closing of the sluice valve at the receiving chamber sewage may be shut off from either one or both of the tanks. When both tanks are cut out the sewage would be by-passed to Robinson's Run.

Across the tanks three baffle boards suspended from the surface to mid-depth are provided. One is about midway of the length of each tank, another about ten feet from the inlet end and the third about six feet from the outlet

end. The effluent is to pass over a weir across the entire width of the outlet end of each tank into a collecting trough extending the entire width of the ends of both tanks from which an eight inch cast iron pipe will conduct the sewage to the sprinkling filter. The elevation of the weir is four hundred and sixty-two. The bottom of the tank here is to be eight and five-tenths feet lower. The slope of the bottom of each tank is one foot in the total length of one hundred and ten feet towards the outlet. At the bottom a twelve inch drain pipe in provided in each tank, extending to Robinson's Run by means of which the deposits in the tank and the sewage, whenever drainage is required, is to be discharged into Robinson's Run. It is reported that these tanks are to be located on the slope so that their foundations will be partly in excavation and partly on an embankment.

About seventy-five feet from the septic tanks are to be located the sprinkling filters. A four inch concrete base is provided to be about one hundred and twelve feet square and sloping six inches towards the outlet side where a concrete collecting gutter twelve inches deep and twelve inches wide is provided to collect the effluent and deliver it to the river. No side walls are contemplated. On this platform, whose elevation is to be four hundred and fifty at the gutter, is to be placed six feet of crushed stone or slag or waste from cement mill, pieces to range in size from one to two inches in diameter. The slag is to rest on underdrains of paving brick or rough stones. No details of this important feature of the design have been submitted.

The sewage is to be delivered onto the filters by means of two four inch cast iron delivery pipes from which right angle one and five tenths cast iron branches are to lead on either side paralleling each other, thirteen feet apart, from which vertical pipes, to be fitted with sprinkling nozzles, are to be attached, so that the surface of the sprinkling filter will have a nozzle at the corner of each thirteen foot square. By means of a valve either one of the four inch iron mains, and hence one half of the total filtering area may be shut off.

The horizontal pipes will rest on the filtering material under but near the surface thereof.

Since the plant is to be continuous in operation and but a comparatively few connections with the sewer system is anticipated for the first year or so, and even if all of the buildings in the borough were connected, the entire flow of sewage daily should not be large, during periods of several hours, especially in the night time, an inconsiderable flow will occur through the plant. In consequence of this dribbling flow, the sewage instead of being sprayed over the surface of the filter beds would barely flow out of the vertical pipes and pass down the filtering material around the pipe. In cold weather this would promote the formation of ice pillars and seriously interfere with the operations of the plant.

It appears that the estimated cost of the disposal plant is about ten thousand dollars and for the sewer system twenty-four thousand dollars, which estimates are believed to be low. If as reported, the assessed valuation of the borough is three hundred and thirty thousand dollars and the present bonded indebtedness four thousand dollars, the limit of the municipal borrowing capacity is nineteen thousand dollars in round numbers. So the borough is not financially able to defray the cost of the sewerage system and the sewage disposal works. But the borough can raise sufficient funds with which to pay for the installation of a proper disposal plant. It is possible for the local authorities to assess the cost of the sewers on abutting properties, and if this were done the entire improvement could be built.

The site of the disposal works, being at the immediate edge of the village, demands that ample precaution should be taken to obviate a nuisance. The receiving chamber and the septic tank should be covered over.

The by-passing of crude sewage or the drainage of sludge and liquids from the septic tanks into Robinson's Run or the river as now contemplated in the plans is objectionable, unnecessary, and should not be approved. The said by-pass is useless. There should be two septic tank compartments, one of which should always be in use, the choice resting with the management. Hence, by this arrangement, necessity for an overflow device is obviated. Further, from the standpoint of a nuisance, more objection could be raised to the sudden emptying of accumulated deposits from the septic tank into the river than to the continuous discharge of crude sewage from the sewer system.

The Department is informed that the septic tanks can be located at a sufficiently high elevation to provide for gravity discharge of the tank effluent and the drainage thereof through a dosing tank to the sprinkling filters. Thus no liquids need be discharged into any water course before having passed through the sprinkling filters.

The sludge should be deposited on a drying area to be located on the further side of Robinson's Run, as far away from Lehigh street as possible. Abundance of lime or other disinfectant should be used to prevent a nuisance. The cleaning out of tanks may not occur more often than every two or three years. Some tanks do not require cleaning more than once every five years, while

others have to be cleaned out every few months. However, the necessity for the preparation of a suitable area upon which to deposit the sludge and to permit the liquid to drain away through porous materials, and the drying of the solid matter, is great enough to demand that provision for it shall be incorporated in the design.

A dosing tank arranged to receive the effluent from the septic tanks and to automatically discharge, when full, the volume upon the sprinkling filters is a prime requisite for the proposed plant.

It appears that one septic tank only should be needed for the present at East Mauch Chunk, but this tank should be divided by a longitudinal reinforced concrete partition, extending the whole length of the tank and dividing it into two equal and separate compartments.

For a similar reason, one-half of the proposed filtering area only need be built at once; but as far as the construction goes, it should be in keeping with the best practice and adapted to future extensions. Complete details upon which the success of a filter plant depends should be worked out and submitted for approval. Undoubtedly, an eighth of an acre of well designed, constructed and operated sprinkling filters would successfully treat the sewage of the village during the first few years of the use of the new sewer system. To overcome difficulties of operation in coldest weather, the filters should be arranged to admit of their operation as contact beds, is desirable. This dictates that there should be concrete walls on the sides with valves at the outlet underdrains, admitting of closing or opening at will, and the underdrainage system should be so designed as to effect complete drainage of any retained dose in the filter in a short time.

The distributing pipes and nozzles should rest securely on foundations or piers provided for the purpose, and the pipe arrangement should be such that a small part of the filter surface can be put out of commission for repairs or cleaning without putting other portions of the filter out of commission.

It should be clearly understood that the bedding material will rapidly accumulate suspended matter and that this will first adhere to the stones, finally dry, crack, peel off and be washed downward to the underdrainage system. At irregular intervals the filter will thus free itself of large quantities of floculent matter, provided ample facilities are afforded on the bottom of the filter in the underdrainage system for the passage away of this stuff. Therefore, a very important factor in the successful operation of a sprinkling filter, is the underdrainage system. Too much care cannot be bestowed on this feature of the design.

It is desirable that these suspended matters should be retained on the premises. They discolor an effluent and have the appearance of sewage. If discharged where now contemplated in the plans, at a point in the river about three hundred feet above the dam and at the head of the canal, they would be liable during a part of the year to pass down with the flow in the canal and deposit somewhere there. This should be prevented. It does not appear why the borough should not provide the customary arrangement for the interception of these solids. A settling tank of about four hours' retention is desirable and should be required.

Relative to the kind of bedding material to be used in the filters, great caution is demanded if slag is to be selected. Some kinds of slag will disintegrate. Broken stone will last and may prove the cheapest in the end. All fine material should be absolutely excluded. Upon the care in selecting the material and placing it will depend the capacity of the filter. A sample of filtering material should be submitted for approval before the beds are constructed.

In view of these and other considerations, the State Department of Health will send an officer to the hotel and four other properties on the watershed to obtain information against those committing nuisances there and take such steps as may be necessary to immediately bring about abatement of the same. And the Mauch Chunk Water Company will be requested to inspect the properties on the watershed once monthly and to submit a report thereof to the State Department of Health relative to any nuisance or menace existing thereon. And the said water company will also be requested to thoroughly clean out the reservoir and to remove all objectionable matter therefrom.

It has been determined that the interests of the public health demand that approval be given and it is hereby and herein given to the proposed sewer plans and a permit granted for their construction under the following conditions and stipulations:

FIRST: That all storm, roof and ground water shall be excluded from the sewer system and that no existing sewers shall be connected or permitted to connect with the proposed sewer system, but the borough shall cause the sewage from all estates now sewered into the Fifth street drain or tributary drains to be discharged into the public sewer system.

SECOND: At the close of each season's work, the borough shall prepare a plan and profile of the sewers laid during the year and file the same, together with such other information relating thereto, as may be required, with the State Department of Health.

THIRD: That in order to exclude ground water from the sewer system, the joints of the sewer pipe shall be laid with a Portland hydraulic cement mortar instead of Rosendale cement mortar. The lamp holes and manholes shall be plastered inside and outside with Portland cement mortar.

FOURTH: In order that the sewers shall be properly laid, it is stipulated that they shall be constructed under the direction and supervision of competent and experienced engineers, skilled in this kind of work.

FIFTH: The local authorities shall make or cause to be made, at least once monthly, an inspection of the sewer system, and if necessary the sewers shall be flushed. A record shall be kept on file in the borough of all inspections and a copy thereof shall be submitted to the State Department of Health whenever required.

SIXTH: All house connections shall be recorded and laid under the supervision of a borough officer. Inattention to this matter may easily render the entire improvement a failure. The total length of house connections in the borough will equal if not exceed the total length of the sewers in the streets. The line from the sewer to the inside of the cellar wall should be straight in line and grade, if possible, and there should be a cleanout plug at the bend of the soil pipe in the cellar. The borough is advised to adopt a set of plumbing rules and regulations.

SEVENTH: The borough shall reconsider the sewage disposal plans and modify and amend them to conform to the general suggestions hereinbefore offered and submit such plans to the Commissioner of Health for approval on or before the beginning of the construction of any part of the public sewerage system herein and otherwise approved. The construction of a sewage purification plant will be required by the State co-temporaneously with the construction of the sewer system, in order that the borough's sewage shall be purified and the effluent only discharged into any of the waters of the State.

EIGHTH: If the sewer system or any part thereof, become prejudicial to public health, in the opinion of the Commissioner, then such remedial measures shall be adopted by the borough, as the State Department of Health may approve or advise.

NINTH: No pathological material from any laboratory shall be permitted to discharge into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

The borough is advised to enforce regulations with respect to cesspools, privies and waste water discharged and to provide and use disinfectants to the end that sanitary conditions may be improved in the borough, pending the installation of the general sewerage system.

Harrisburg, Pa., July 24th, 1907.

EAST McKEESPORT, ALLEGHENY COUNTY.

This application is made by the borough of East McKeesport and is for permission to build certain sewer extensions and to discharge the sewage therefrom into the waters of the State.

It appears that East McKeesport is a resident municipality of about three thousand population, located in the valley of Turtle Creek, Allegheny county, and in North Versailles township. Said township bounds the borough except on the northwest, where is the borough of Wilmerding. The citizens of East McKeesport pass by trolley line to the nearest railroad station, which is at Wilmerding, fourteen miles east of the Pittsburg Union Station.

The greater part of the town is on a hill or table-land elevated from three hundred to five hundred feet above Turtle Creek. The natural drainage of East McKeesport is principally into two runs, extending in a northwesterly direction and emptying into Turtle Creek, one passing through North Versailles township and the borough of Wilmerding and the other through said township and the borough of Wall. A small part of the southern end of the borough drains to Crooked Run, which empties into the Monongahela river after flowing through North and South Versailles townships and the city of McKeesport.

The street grades are ample and a few are steep. Plank side walks are in general use. Some of the streets are paved and surface water readily finds its way to the natural water courses.

Formerly the borough was undermined with coal, but it has all been taken out and the mines abandoned, with a few exceptions.

The population consists principally of the families of mechanics, employed in the various manufacturing establishments in the borough situated along Turtle Creek.

The water supply is furnished to the town and the Turtle Creek district principally by the Pennsylvania Water Company, but the pipes in East McKeesport are owned by the East McKeesport Water Company. There are also a few private wells and springs in the borough. They appear to be free from pollution. The wells which are in use are driven or bored and encased in pipe. The springs flow from pipes driven in the side of the hill.

The borough has a partial system of sewers on Oriole and Greensburg avenues, and on Santos and Chicora streets, Broadway and Josephine avenue, discharging into an abandoned mine through an opening near the southern part of the borough on Oriole avenue. The pipes in this system vary in size from eight to twelve inches, and have a total length of about thirty-six hundred feet. It is reported that there are fifty-five connections to this sewer. From the abandoned mine the drainage ultimately flows into Crooked Run and thence by said run and passing through the city of McKeesport, a total distance of about two and three-quarters miles to the Monongahela river.

The mouth of this stream is above the point from which the Pennsylvania Water Company draws crude river water for emergency purposes whenever the supply from its other source in the Allegheny river proves insufficient. Both the city of McKeesport and the borough of Duquesne are situated on the Monongahela river above this emergency intake and discharge their sewage into the stream at points from one to three miles distant. In view of the existing conditions, the East McKeesport authorities have not considered it advisable to compel connections to be made to the system of sewers indirectly discharging into Crooked Run. So far as the Department is informed, no complaints have been made in regard to this disposition of the sewage.

On Victor avenue, in the northern part of the borough, there is a six inch sewer pipe from five houses belonging to the Cosmopolitan Building and Loan Company of Pittsburg, which empties onto an abandoned mine dump beyond the borough limits in North Versailles township.

Throughout the town there are a number of privies and cesspools in use, many of the latter consisting of holes drilled into the mines underlying the greater part of the borough. Some of these holes empty into the mine whose principal outlet is into Crooked Run Valley and with respect to these holes there seems to have been no complaint.

The others discharge into abandoned workings, part of which drain into the mine now operated by Mr. H. S. Welsh, and it appears that the odors from such disposition make it almost impossible to operate this mine during the warm months of the year. At the time of the Department inspection, on July twenty-ninth, the air in the mine a short distance from the outlet was heavy and had a musty odor such as might come either from sewage or from decay of timber. The foreman was compelled to dismiss men who had reported for work at the mine in the morning of the same day.

Some of the mine water which is alleged to be polluted with sewage escapes on the surface near the intersection of Morrelle avenue and Chipco alley. The complaint has been made by residents in the vicinity about offensive odors arising from this mine outlet at stated intervals.

A number of houses in the borough having inside water closets in use discharge all wastes into street gutters. This practice has been condemned by the local authorities and many abatements affected, but there are some cases where sewage is still discharged into street gutters. Kitchen wastes are very generally emptied into the highways where the houses do not have a sewer connection and in consequence there is an offense in warm weather. Disinfection is attempted through the use of lime sprinkled in the gutters.

The application of May eighth is for permission to construct a sewer ranging in size from fifteen to sixty inches in diameter and designed to carry both sewage and surface drainage. This sewer is to begin in the north central part of the town at Park and Fifth avenues, thence down Fifth avenue and in the ravine beyond the borough through North Versailles township and the borough of Wall to Turtle Creek, total length about one mile. The plan does not show any branches or laterals, although the sewer will be of little service without them since there are practically no houses on this part of Fifth avenue in the borough.

The application of August second, one thousand nine hundred and seven, is for permission to extend the line of sewers already in use in Josephine avenue, along said avenue and in Punta Gorda avenue and De Sota street to Argo alley, making a total length of eight hundred and ninety feet of twelve inch pipe. This proposed extension of the sewers now discharging into the mine is intended to relieve the nuisance due to the discharge of sewage into the gutters on De Sota street and Punta Gorda avenue.

There appears to be no reason why roof or surface water should be admitted to the proposed sewer and hence the size may be reduced to eight inches because the district tributary to it is small.

Turtle Creek constitutes the natural channel for drainage of the greater part of the borough of East McKeesport, as well as for the borough of Trafford City, Pitcairn, Wall, Wilmerding, Turtle Creek and East Pittsburgh, and also for various townships in Allegheny and Westmoreland counties. A part of North Versailles township which is on the south side of the creek and Patton Township which lies opposite on the north of the creek are likely to be built up in the near future since they afford desirable sites for residences being above the smoke and dirt issuing from the manufacturing plants, and at the same time near enough to them so as to make it easy for the employees to get to and from

their work conveniently, in fact, a portion of the township adjoining East McKeesport is already being developed and desirable residences constructed there. Similar developments are also taking place in Patton township adjoinnig Turtle Creek borough.

Turtle creek drains an area of about one hundred and fifty-one square miles, over one-half of which is in Westmoreland county. The two principal tributaries are Thompson Run, having a drainage area of nineteen square miles and flowing into Turtle Creek near the borough of the same name, and Brush Creek, having a drainage area of about fifty-nine square miles emptying into Turtle Creek at Trafford City borough.

On this area there are seventeen mines in operation and eight more which are abandoned, all draining sulphur water into the stream. The total daily flow of this mine drainage measured by the Department, was approximately thirty-four cubic feet per second, equivalent to approximately one-third of the flow of Turtle Creek at the time by estimation. Since the measurements were distributed over a number of days under various weather conditions and since many of these mines respond quickly to rain falls, the total given is not of any particular significance. Owing to the presence of so much acid, the water of Turtle Creek has a very corrosive effect on boiler tubes and on condensers. It is used for cooling purposes and for condensing by a number of the large manufacturing plants along the stream.

There is a dam on Turtle Creek at Trafford City borough, where the Westinghouse Foundry Company has its intake; there is a dam at the intake of the Westinghouse Machine Company at East Pittsburgh. The latter is low and causes no appreciable obstruction to the flow of the stream.

Brush Creek received sewage from the boroughs of Jeannette and Irwin, and possibly from other places. Turtle Creek at its junction with Brush Creek receives sewage from the borough of Trafford City and below this point receives sewage from the boroughs of Pitcairn, Wilmerding, Turtle Creek and East Pittsburgh. It also receives sewage and manufacturing wastes from the plant of the Westinghouse Foundry Company, employing about five hundred hands, at Trafford City; form the Pennsylvania Railroad shops, employing about eighteen hundred hands, near Pitcairn; from the Westinghouse Air Brake Company, employing about four thousand hands, at Wilmerding; and from the Westinghouse Electric and Manufacturing Company, employing twelve thousand hands, at East Pittsburgh. The sewage from the last named plant enters the creek below the dam opposite the works of the Westinghouse Machine Company, at East Pittsburgh, which employs about twenty-five hundred hands and discharges sewage into the creek.

During periods of dry weather portions of the creek from Trafford City to its mouth comprise a series of pools with very little velocity, which appear to be filling up. The surface slopes of the creek basin are generally steep and free from timber, so the run-off is rapid and the storm flows of the creek are excessive and operate to scour out deposits. At such times the precipitating and destructive power of the acid mine drainage is to offset and the sewage pollution is carried to the river and thence to and by the intakes of numerous water works along the Ohio river in the state.

From the standpoint of nuisance, it would be possible within a few years, if the sewage from the rapidly increasing population were discharged into Turtle Creek from all of the municipalities in the drainage basin, for the diluting ability of this sulphur stream to become overtaxed and hence its occurrence should be prevented by the adoption of such plans as may be found advisable and best adapted to the end in view. The scheme should be comprehensive and admit of growth as the district developes. If one municipality be permitted to permanently discharge its sewage into the stream, then in justice all of the municipalities in the Turtle Creek drainage area should be permitted to do likewise. Hence to prevent the inevitable nuisance in the creek, and at the same time to diminish the pollution of the Ohio river, and therefore the source of drinking water to many municipalities, all of the boroughs and towns along Turtle Creek should plan to eventually discontinue the discharge of sewage into the waters of the State.

The whole region is likely to be built up within a reasonable term of years and may perhaps be annexed to the city of Pittsburg, in which event the problem would find its solution in the formation of a sanitary district comprising the boroughs and townships along Turtle Creek at least below Trafford City, with an intercepting sewer system to convey domestic sewage only from the district regardless of municipal boundaries to a single point of discharge, where a disposal plant should be erected. This scheme would involve the pumping of the sewage and also the elimination from the system of all roof and storm water. The cost would be great and renders the project rather impracticable of immediate attainment. Nevertheless, the sewers to be built in the various boroughs and villages now and in the future, can be laid out in anticipation of the final consummation of such a general project for the whole region, and at the same time subserve the interests of public health, efficiency and economy at the present time.

So it appears entirely undesirable for the borough of East McKeesport to construct the proposed combined sewer on Fifth avenue and thence northerly down the ravine to Turtle Creek.

It would appear, however, that the present sanitary conditions in the borough are undesirable, and that the interests of the public health demand that the proposed extensions of the existing sewers, whose outlet is into the mine, be approved temporarily, until some other scheme can be perfected for the collection and disposal of the entire sewage of the borough.

It has been determined that the interests of the public health demand that a permit be withheld and it is hereby and herein withheld for the construction of the proposed sewer with an outlet into Turtle Creek; but it has also been determined that the interests of the public health demand that permission be granted and it is hereby and herein granted to the said borough to construct a line of sewer from the present terminus on Josephine avenue, along said avenue, Punta Gorda avenue and De Sota street as proposed and to discharge the sewage therefrom temporarily through existing sewers and ultimately into Crooked Run, under the following conditions and stipulations:

FIRST: That roof and storm water shall be excluded from the proposed sewers and the sizes thereof be reduced, preferably to eight inches in diameter since this size would be ample to provide for the removal of domestic sewage only.

SECOND: That not later than June first, one thousand nine hundred and eight, the borough shall prepare and submit to the Commissioner of Health for approval plans for a system of sanitary sewers for the entire borough, and for the proper disposal of the sewage thereof, either independently or in conjunction with the borough of Wall, or other municipality and for this purpose the local authorities are advised to engage the services of a consulting engineer to assist the borough engineer in laying out such comprehensive system or sewerage and sewage disposal works.

THIRD: It is expressly stipulated that the State Department of Health by this permit shall not create any new rights, but hereby continues whatever existing rights the borough of East McKeesport may have to discharge sewage into the opening into the mine on Oriole avenue in the southern part of the borough. And this permit to discharge sewage indirectly into the waters of the State shall cease on the first day of June, one thousand nine hundred and eight; but if the borough shall have complied with the other conditions of this permit, then the Commissioner of Health may extend the time in which sewage may be discharged into the waters of the State.

FOURTH: The borough council shall, by ordinance or otherwise, prevent the continued discharge of household wastes upon the streets and alleys, or the discharge of sewage into such parts of the mine workings within the borough as drain into the colliery now being operated by the said H. S. Welsh.

FIFTH: No pathological material from any laboratory shall be discharged into the system. The proper authorities shall cause these wastes to be destroyed on the premises.

The attention of the local authorities is especially called to the fact that several of the municipalities in Turtle Creek Valley have applications for sewer extensions now pending in the Department of Health, and that the State's policy for all will be uniform, and the Commissioner of Health will be glad to render advisory service as far as his Department may do this in cooperation with the borough, after the latter shall have taken the initiative.

Harrisburg, Pa., October 7, 1907.

EDGEWORTH, ALLEGHENY COUNTY.

This decree was issued to the borough of Edgeworth and relates to the enforcement of the terms of the permit issued by the Commissioner of Health to the borough of Edgeworth, Allegheny county, in response to an application dated November fifteenth, one thousand nine hundred and six, to extend its sewer system and to establish a new sewer system and to discharge the sewage therefrom, untreated, into the Ohio river. The permission related to proposed sewers in Church Lane and Chestnut Road, with their lateral connections. The conditions and stipulations were as follows:

FIRST: That these sewers shall be used exclusively for the removal of storm water, except such sewage as it may be deemed advisable to temporarily discharge therein from abutting estates whereon a nuisance exists, pending the construction of a sanitary sewer system in the borough into which said sewage is to be ultimately discharged.

SECOND: That during the time said sewers are used to convey sewage from existing sewers, or private estates, the amount of storm water admitted to the sewers shall be regulated by the number of inlets to be provided, so that said sewers shall not be surcharged and backflooded.

THIRD: Plans for a separate system of sewerage for the entire borough shall be prepared and submitted to the Commissioner of Health for his appproval on or before the first day of May, one thousand nine hundred and seven.

FOURTH: This permit to discharge sewage into the Ohio river shall cease on May first, one thousand nine hundred and seven, provided, however, that if the borough shall have submitted on or before said date the plans herein called for, for a separate system of sewers, then this permit to discharge sewage into the river shall continue in force until October first, one thousand nine hundred and eight. If at that time all the conditions of this permit shall have been complied with, and the interests of the public health demand it, the Commissioner of Health may extend the time for the discharge of sewage from said borough into the Ohio river.

It was unanimously agreed that the interests of the public health demanded that a system of sanitary sewerage be adopted for the entire municipal territory, and that whatever storm drains may be necessary, shall be constructed and maintained independently of the sewage conduits.

It was also agreed that the interests of the public health demanded that before the borough shall take over, use and maintain the Hazle Lane district system for the removal of both sewage and storm water which now gets into it, and may get in through extensions and numerous proposed street inlets, the borough should prepare and submit to the Commissioner of Health for his approval a plan whereby as many of these existing sewers as may be found expedient shall be incorporated into a strictly sanitary sewer system, planned for the entire borough, and the others into an exclusive storm drain system.

On March twenty-third, one thousand nine hundred and seven, in compliance with the terms of the permit of one thousand nine hundred and six, the borough authorities submitted a plan for storm water drainage for the borough, which plan has been considered and the following conclusions reached in relation thereto:

It appears that the borough has purchased and taken over into its sewer system the Hazle Lane sewer system, formerly owned by private individuals. The system comprises eighty-one hundred feet of sewers ranging in size from nine to twenty-four inches in diameter and serving about one hundred and twenty-five people. They take both sewage and storm water. There is no evidence before the Department that since the acquirement of these sewers by the borough the storm water has been cut out. These sewers are in the eastern part of the town in the district drained by Quaker Run and it is the purpose of the borough authorities to use the existing sewers here for sanitary purposes and to provide for surface drainage in the streets either by gutters or by pipes which will receive rain water only and discharge it into the run.

The Department is not informed whether the Chestnut Road sewer system, comprising a total length of sixty-five hundred feet of sewers, ranging in size from six to ten inches in diameter, serving about one hundred and fifty people and taking both sewage and storm water have been purchased and are now controlled by the borough. The Department is also uninformed whether the Edgeworth Road sewer district comprising forty-two hundred feet of combined sewers and being eighteen inches in diameter has been purchased and is now owned by the borough but the report has been received that all the private sewers in the borough are now owned and operated by the municipality.

If this is so, there are three and a half miles of combined sewers, formerly owned by private individuals now public sewers, removing sewage of about three hundred and fifty people out of a total population of about fourteen hundred.

The Department is informed that the borough has completed the Chestnut Road system by constructing a new thirty-six inch sewer outlet into the river at the foot of Chestnut Road and by building new sewers in Highland Lane, Woodland Road, Beaver Road, School Lane and Meadow Lane, whose diameters range from twelve to thirty inches, and that this system receives surface water from the streets in the thickly built up part of the town. Whether the old sewers in some of the streets are still in existence and being used is not known. Permission was granted in the year one thousand nine hundred and six for a new sewer outlet into the river in the extension of Church Lane as well as the Chestnut Road system. Thus it will be seen that the sewer system of the municipality, if all sewers are now owned by it, has five outlets into the river, three being old ones and two being new outlets. The proposed plans of the borough for surface drainage do not call for changes in the sewer system as it now exists and is used.

The authorities intend to use the sewers now constructed and in the future, when storm drains are necessary for the removal of more water than the existing sewers can provide for, to build conduits for storm water only with outlets into the nearest stream. The borough engineer represents that the re-construction of the sewers in the streets where pipes have already been laid would be attended by so many inconveniences to the estates abutting the sewers, that the borough prefers to continue the use of the present sewers as carriers of storm water and to assume the extra expense in the proportionate enlargement of sewage disposal works necessary to treat the combined sew-

age and storm water. It is argued that the admittance of storm water can be regulated and diminished and if necessary, altogether prevented, in the future, when sewage disposal works are built. It is further argued that the separation of sewage from storm water can be effected as economically then as now, and that the problem of how much of the storm water should be eliminated from the sewer system is one for an engineering expert to grapple with at the time the sewage disposal problem is up for settlement.

In view of the consideration that the borough's plan, though probably not intentionally, is an evasion of the intent of the State Department of Health clearly expressed in the permit issued, it has been determined that the borough be requested to submit a plan for a separate system of sewers, together with a report informing the Department of the additions it has made to its sewer system and the facts as to the admittance of rain water and sewage to the system. The terms of the permit of the year one thousand nine hundred and six may be considered as having been complied with in so far as the plan has been submitted prior to May first, one thousand nine hundred and seven, and the question now comes on this plan, which not being satisfactory calls for material changes which should be made without delay.

The attention of the borough authorities might well be called to the fact that the object to be attained by the adoption of a plan for a general sewerage system for sewage only is to secure the construction of such a plan, and as many of the existing sewers as may be found expedient, should be incorporated into this strictly sanitary sewer system.

Harrisburg, Pa., April 29th, 1907.

EDINBORO, ERIE COUNTY.

This application was made by the borough of Edinboro, Erie county, and is for permission to install a system of sewerage and to discharge the sewage therefrom, untreated, into the Conneautee creek, within the limits of the borough.

It appears that Edinboro was organized into a borough by special legislative enactment of eighteen hundred and forty. Its present population is about nine hundred. It is located in the Allegheny river basin near the head waters of the Conneautee creek (a tributary of French creek which joins the Allegheny river at Franklin City) in the centre of the farming district, traversed only by the Erie, Edinboro and Cambridge Springs Electric Railway. Its future growth is not expected to be more than normal. Accessions to its population would be promoted, it is thought, were improvements afforded such as a public water system and sewerage.

An educational institution, bearing the official title of State Normal School, is located on a twenty-nine acre tract of land in the southeast corner of the municipal territory, about one-half of this area being located within the borough and the other part in Washington township, which entirely surrounds the borough. Connected with the school are the usual boarding halls, class buildings, power plant, and so forth, in which an average number of five hundred people, including students, teachers and helpers, will be accommodated when improvements now under way have been completed. For the present about seventy-five per cent. of the student body board in private families in the borough. The water supply of the institution is obtained from three driven wells sunk to a porous gravel bed covered by an impervious hardpan located about eighteen feet below the surface of the ground. The pipes are thirty-six feet deep. Analyses of this water, made in the chemical department of the institution, show it to be of excellent quality, so it is reported.

The wastes from the kitchen are discharged into a cess-pool, otherwise the sewage from the buildings is discharged into the Conneautee creek through two sewers which empty at a point below the borough line.

The borough is laid out around the southerly part of Conneautee Lake, and the creek bearing the lake's name drains the borough and flows into French creek after coursing for about seven miles through farming land. The point where Conneautee Creek empties into French creek is at or just below Cambridge Springs borough, where there is a pool out of which Cambridge Springs draws its public water supply after polluting it with its own sewage.

There is one other private sewer in Edinboro which empties into the creek at a point about two hundred feet below the grist mill dam at the end of Erie street.

With the exception of these three private sewers, the last one of which is used by six families, the people of the town are largely served by outside privies and in about a dozen cases by cesspools. The desire for modern sanitary facilities has created a demand for the construction of more cess-pools and it is the possibility of the pollution of ground water by percolation that has been the occasion for the consideration of a public sewerage system.

The domestic supply of water for Edinboro is obtained mostly from driven wells, averaging a depth of thirty-five feet. There are a few dug wells, walled up with loose stone, but they are looked upon by the local Board of Health with suspicion. Public sentiment is strongly against the use of dug wells and such structures are being abandoned in favor of driven wells.

In the western part of the borough six individuals have formed a co-partnership and have supplied their dwellings with ground water which is drawn at will from a tank elevated sixty feet above the ground.

Some sixty persons are supplied with ground water by V. B. Billings, who maintains a private system for eleven residences and six building blocks, including his own property, located in the eastern part of the borough. The water is obtained from three driven wells.

So far as the Department is informed, all of the ground water in the borough has proven satisfactory, but it may be well to note that the danger of contamination of the water is not a negligible matter, more especially since the impervious hardpan covering the waterbearing stratum at the Normal School does not extend throughout the borough. In some places such a barrier to surface pollution is reported not to exist. Therefore, carelessness in the disposal of household wastes into percolating cesspools would constitute a menace to the ground supply of the residences in the town.

For the purpose of affording a proper outlet for sewage in those houses in the town where the present method of disposal of sewage is into a privy or cesspool and where, possibly, water closets and bath tubs would be installed were sewerage facilities afforded, the borough authorities have deemed it essential and necessary that a system of sewers be built by the town and therefore it is proposed to construct eighteen inch sewers in Erie and Waterford streets having in outlet into the creek at the foot of Erie street; also an eighteen inch sewer in Normal and Meadville streets with an outlet into the creek at the foot of Normal street.

The petitioners have considered the necessities of the case from the local standpoint only. Because the sewage of possibly seven hundred people at times is discharged into the creek from the State Normal School, it seems to the borough authorities to be fair to expect a permit to increase the pollution of the creek by the town sewage. The argument offered that the ground water supply should be conserved carries conviction, but nowhere does it appear essential in removing the possibility of pollution of the ground water in the borough to increase the contamination of the waters in the creek. To the contrary, since the head waters of French creek are not kept in a pure state, it will be futile for the State to require that sewage pollution of the streams farther down shall cease, and since Cambridge Springs, Meadville and other places in the French creek valley have been required to consider some other plan for the disposal of their sewage than into the waters of the State, consistency dictates that the borough of Edinboro shall, in constructing a public sewer system, provide proper works for the disposal of the sewage.

Undoubtedly, a public sewerage system will materially advance the growth of the borough and the town can probably better afford to properly dispose of the sewage of each resident than to require a masonry tight privy vault and cess-poll to be provided and used at every estate. Therefore, should the local authorities prefer the sewer system to the other protective measure, then the sewers should be planned in a comprehensive way so as to be able to take in all of the streets of the borough, to exclude storm water, and to convey the sewage to a sewage disposal plant. This plant could, with economy both with respect to construction and operation, be designed to take care of the sewage of the State institution as well as the borough. The institution's sewage should not be permitted to continue to discharge into the waters of the State.

It has been determined that the interests of the public health demand that the permit asked for be withheld, and it is hereby and herein withheld, until the borough authorities shall have employed a competent engineer to design a comprehensive system of sewerage and sewage disposal works for the entire borough. After adopting said plan, the local authorities shall submit the same to the State Department of Health for approval, which may modify, amend or approve the plan and fix the time in which sewage from any part of the sewer system may be temporarily discharged into the waters of the State, if at all.

The suggestion is made to the authorities that the plans should include the treatment of the State Normal School sewage provided equitable arrangements can be made between the authorities of the municipality and the school.

The superintendent of the State Normal School will be notified of the action taken by the State authorities with respect to the borough's proposed sewers and the request be made that the institution co-operate with the town to the end that there shall be one sewage disposal plant for the treatment of both sewages.

Harrisburg, Pa., April 29, 1907.

ELLWOOD CITY, LAWRENCE COUNTY.

This application was made by the borough of Ellwood City, Lawrence county, and is for permission to extend its sewer system and to discharge the sewage therefrom, untreated, into the Connoquenessing creek, within the limits of the borough.

It appears that Ellwood City borough is a manufacturing town located on the south bank of the Connoquenessing creek about a mile above its entrance to the Beaver river. It has a population of about thitry-two hundred within the municipal limits and including its environs four thousand people. Located on a sand-stone table-land in the extreme southern part of Lawrence county and originally intended for a summer resort by its promoters, the Pittsburg Land Company, fortune did not favor the place until after it became incorporated as a borough about one thousand eight hundred and ninety-five, and industries located there. Recently several additions have been made and now among other industrial plants are the National Tube, Pennsylvania Stove, Steel Car Forge, Ellwood Brick, Shelby Steel Tool, Hartman Manufacturing, and the Pittsburg Manufacturing Companies. In the vicinity are several sand-stone and lime-stone quarries. The borough bids fair to sustain a robust growth. Already streets have been laid out through the highlands southerly into North Sewickley township in Beaver county.

Just above the borough and east of it the creek turns abruptly to the south, and at this point a tributary named Slippery Rock creek coming down from the north joins the main stream. Connoquenessing itself drains the larger part of Butler county and a part of Beaver county before it reaches Ellwood City. These two streams afford the borough its water supply. The works are owned by the Ellwood Water Company, a subsidiary corporation of the Pittsburg Land Company. There is a pumping station on each stream, and the raw water is raised thereby through the mains of the town to a distributing reservoir located on the hill in North Sewickley township, and having a capacity of less than one million gallons. The daily consumption of the borough is reported to be in excess of the storage of this reservoir.

The pumping station on Slippery Rock creek is operated by electricity generated at the Connoquenessing pumping station which is in the northeast part of the borough at the dam across the creek owned by the company and erected for power purposes. This dam forms a pool, backing the water half way up to the mouth of Slippery Rock creek. Ordinarily the supply is taken from Slippery Rock creek because it is more satisfactory for domestic use. The Connoquenessing is at times strongly impregnated with salt from gas and oil wells, and it also receives sewage from Zelienople, Butler and other sources.

Whenever repairs are necessary or for any other reason the Slippery Rock pumping station machinery is put out of commission, the water from the Connoquenessing is pumped directly into the town and to the distributing reservoir.

There are about fifty drilled wells generally scattered over the borough supplying probably two hundred people, so the public supply is furnished to nearly all of the inhabitants.

Approximately one thousand people are accommodated by shallow earth privies. Cess-pools are few, probably not over ten in the borough. The remaining population have availed of the sewerage facilities.

There are three sewer outlets in the borough, one into the creek just below the dam, the other down stream opposite the foot of Sixth street and the other still further down stream opposite the foot of Tenth street. All three discharge both sewage and storm water.

The first outlet is twenty-four inches in diameter, serves the east part of the town and a portion of the hills south of the railroad, drains all told about one hundred acres and connected with the system are approximately one hundred buildings accommodating five hundred people. The smallest sewer in the system is twelve inches in diameter and the total length, including the outlet is slightly over one mile.

The Second or Sixth street outlet, twenty-four inches in diameter serves the central part of the town and all of the rising land south of the railroad in the central and western parts of the borough, drains all told about one hundred and fifty acres, and connected with the system are approximately two hundred and seventy buildings accommodating one thousand three hundred and fifty people. The lower or Tenth street outlet, twenty-four inches in diameter, at present drains fifteen acres in the western part of the borough. Few buildings are connected with this sewer. Its length is less than one-half mile.

Some of the town sewers were laid by the Pittsburg Land Company before the incorporation of the borough, and they are reported to be in poor condition. The greater part of the system, however, was installed since one thousand eight hundred and ninety-five and was well built. There are no private sewers with outlets into the Connoquenessing creek but some sewage from the

Shelby Steel Tube Works reaches a small run in the borough which empties into Connoquenessing creek about six hundred feet below the Sixth street outlet.

The sewers are not large enough to take care of the storm water reaching them during the heavy rainfalls.

The borough proposes to make several lateral sewer extensions to the present Sixth street sewer system as follows: Fifteen inch pipe, Lawrence avenue, length nine hundred feet; eight and ten inch pipe, Seventh street and alley, length eight hundred feet; ten inch pipe Circle alley, length nine hundred feet; eight inch pipe Wayne avenue, length one hundred and fifty feet; ten inch pipe, Sixth street, length one hundred and fifty feet; ten inch pipe Fifth street, length four hundred feet and eight inch pipe, Pittsburgh Circle, length four hundred feet.

The Lawrence street sewer will receive street drainage. The Sixth street sewer is to be combined. The others will receive roof water and sewage. The proposed sewers will add ten per cent. to the total length of the system in the borough.

At the present time at least twenty-eight thousand people take their water supply form the Beaver and Ohio rivers within twelve miles of Ellwood City and below it. The nearest place is Beaver Falls nine miles below with a population of twelve thousand, next New Brighton one mile further on, population eight thousand, then Rochester one mile still further on, five thousand population and Beaver, twelve miles below Ellwood City, population three thousand in round numbers. The first three municipalities are furnished with filtered water taken from the Beaver river opposite Beaver Falls. Beaver derives its supply from a crib in the bottom of the Ohio river.

If for any cause the filters did not adequately purify the water or raw river water were introduced into the pipe system of these places, Ellwood City's sewage might enter the homes and be drank by any one of the twenty-eight thousand people within three or four hours from the time the sewage were discharged into the Connoquenessing creek.

In the interests of public health the City of New Castle whose sewage enters the Beaver river farther up than the sewage of Ellwood City, has been required by the State authorities to prepare plans for the discontinuance of the discharge of such sewage into the waters of the State.

Above Ellwood City the boroughs of Butler, Zelienople, and Harmony empty their sewages into the Connoquenessing creek. When the Butler epidemic of one thousand nine hundred and three and one thousand nine hundred and four was at its height, there was an increase in the typhoid fever rate at Ellwood City, so it is reported. The said epidemic was caused by the pollution of the surface waters supplied to the town. So long as a similar pollution is possible on the eight hundred mile watershed of the Ellwood City supply, the Connoquenessing creek water unless filtered, is a dangerous source. Furthermore, this danger is very materially increased by the pollution of this supply by the sewage of the municipalities above mentioned, and to diminish the danger, the State Department of Health has required the boroughs of Zelienople to prepare plans for the treatment of its sewage and to submit the same for approval, and other measures will be taken to safeguard Ellwood City's supply.

Consistent with this policy the State should exercise its authority to stop the pollution by Ellwood City's sewage, of the stream out of which other municipalities obtain their drinking water.

The assessed valuation of the borough was reported to be about one million dollars, and its bonded indebtedness fifty-two thousand dollors. If these figures be correct, the debt cannot be increeased more than eighteen thousand dollars without exceeding the limit fixed by law. Eighteen thousand dollars would not be enough, or anywhere near enough to defray the cost of intercepting the borough's sewage and building sewage purification works for its treatment, but this problem can be taken up now, plans prepared and estimates made of the cost of the undertaking and a plan of procedure laid down whereby this necessary improvement shall be brought about at the earliest practicable moment.

In view of the consideration that the proposed additions will not add materially to the pollution of the creek, and in view of other considerations, it has been unanimously agreed that the interests of the public health demand that a permit be issued, and it is hereby and herein issued for the proposed sewer extension under the following conditions and stipulations:

FIRST: That roof and storm water shall be excluded from the sewers, or if admitted, then admitted temporarily under agreement that they shall be excluded from the sewers provided it is later determined that such exclusion be necessary.

SECOND: That the borough authorities shall employ an engineer to design a comprehensive system of sewerage and sewage disposal for the entire borough and submit the plans thereof, together with a report to the Commissioner of Health for approval on or before October first, one thousand nine hundred and seven.

THIRD: This permit to discharge sewage into the Connoquenessing Creek shall cease on the first day of October, one thousand nine hundred and seven. If on that date, the terms of this permit have been complied with, the Commissioner of Health may extend the time in conformity with a plan of procedure agreeable to the Governor, Attorney General and Commissioner of Health, whereby the local authorities shall bring about an interception and purification of the borough's sewage at the earliest practicable date.

FOURTH: On or before October first, one thousand nine hundred and seven the borough shall file with the State Department of Health a complete set of plans and profiles of the existing sewers in the borough.

FIFTH: No pathological material from any laboratory shall be permitted to discharge into the system. The proper authorities shall cause these wastes to be incinerated on the premises.

Harrisburg, Pa., April 29th, 1907.

FORD CITY, ARMSTRONG COUNTY.

This application was made by the borough of Ford City, Armstrong county, and is for permission to extend its system of sewers and to discharge sewage therefrom into the Allegheny river within the limits of the borough.

It appears that the borough of Ford City is an industrial community of about four thousand population and that its growth during the last decade has been rapid. The population has nearly doubled during this time.

The town is situated on the east bank of the Allegheny river and on the Buffalo and Allegheny Valley division of the Pennsylvania Railroad system, about four miles below Kittanning, the county seat.

The area is small—three hundred and nine acres—which is hemmed in between the hills on one side and the river on the other, and here, sometime since, the Pittsburg Plate Glass Company located its factories three, four and five, and laid out and built up the town. These works now give employment to about twenty-five hundred men. The Ford City China Company, whose plant is also located in the borough, employs about three hundred hands.

The municipal territory averages a maximum width of eighteen hundred feet only and narrows down to a point in the south-eastern part of the borough. Along the river bank and distant therefrom about three hundred feet extend the railroad tracks and between them and the river are located the manufactories.

The public water supply is furnished by the municipality principally, and will be wholly in the near future. Prior to the incorporation of the borough, the Plate Glass Company had laid pipes in some of the streets and supplied the citizens with water therefrom, these pipes being a part of the water works system of the company's works. The water at that time was pumped from the river into a brick lined reservoir, holding about one million gallons and located on the hills. From this reservoir an independent supply main, twelve inches in diameter delivered the water to the town.

In the year one thousand eight hundred and ninety-nine, at the date of the incorporation of the borough, the company sold the water pipes in the streets to the borough but continued to supply water to the people by means of these pipes under special contract with the borough authorities, which was continued until one thousand nine hundred and five, when the municipality erected a pumping station and sunk a filtering well in the bank of the river at the foot of Thirteenth street, which is near the upper boundary of the town and laid a system of water pipes in the unpiped streets of the borough. At this time the municipality also purchased the reservoir on the hill.

The filtering well at the new pumping station appeared to give water of a satisfactory quality but it was insufficient in quantity, and hence during the summer of one thousand nine hundred and six, an additional well was provided near the first one but on the shore of the river. The final test of this well has not yet been made. The deficiency in the municipal supply has been made up by purchasing the water from the Plate Glass Company under special arrangements.

There are a few wells in the borough, possibly a dozen. The probability is that there never will be a large number of private wells, because the streets are quite thoroughly piped and public water is available to the citizens.

It should be noted that there are comparatively few privies and cess-pools in the town. About ninety per cent. of the municipal territory is sewered. In the unsewered portion, which is the part for which application for sewers has been submitted and is now under consideration herein, the properties are provided with ordinary privy vaults, the waste water being discharged onto the surface of the ground in most cases.

Ford City was established and built up by the Plate Glass Company, so in common with the other public utilities, the present sewer system was designed by said company prior to the town becoming a borough. At the date of the incorporation of Ford City borough the company turned the sewers over to the municipality.

Owing to the limited area and topography of the town, it being a level plateau, elevated about fifteen to eighteen feet above the ordinary stage of the river, but subject to entire inundations during periods of extreme freshets, the problem of most importance has been the removal of surface water from this area, which comes down in torrents during rain falls from the precipitous hillside and would pond up to the inconvenience and damage of individual and the public, were it not speedily removed from off the plateau into the river. Hence surface drainage was considered paramount and this dictated the construction of a combined system of sewers to take both storm water and sewage.

The engineer who designed the system found it economical to provide for three outlets into the river, one for the lower, one for the central, and the other for the upper part. The two last named outlets have been constructed in conformity with this general plan. The drain which serves the central part of Ford City, known as district B, is fifty-four inches in diameter and serves one hundred and seventy-one acres. It empties into the river at the foot of Eighth street and comprises a system of about three and eight-tenths miles. The sizes range from fifty-four to twelve inches in diameter, and connected with these sewers is an approximate population of twenty-five hundred.

The upper district, known as district A, comprises sixty-three acres and is served by a forty-eight inch outlet which empties into the river at the foot of Eleventh street. It serves a population of about one thousand people and comprises a system of one and three-tenths miles, the sewers ranging in size from forty to twelve inches in diameter.

The third sewer outlet has not yet been built. It was designed to serve district C, comprising seventy-four acres, of which thirty-four lie east of the railroad and will be built upon. Here at present there are living about five hundred people. The area is extremely flat and swampy, the water coming down from the hillside or that falls from the clouds directly on it remains in low places, becomes stagnant and a source of discomfort to the neighborhood. Strong odors emanate from the swales, they are said to be mosquito breeders and the petitioners represent that the conditions are entirely insanitary and a menace to the public health.

Surface drainage from this area is demanded even more than the removal of sewage. In fact, were it not for the necessity of providing for underground drainage for the removal of the water, probably application would not be made at this time for sewers for the disposal of sewage only. There is no assurance that the present method of disposal of excrement will be abandoned, should the sewers petitioned for be approved and constructed. However, as a rule, sewerage facilities in the other two districts of the borough have been very generally availed of, the principal exception obtains with the properties on Seventh avenue, which is at the foot of the hills. It is stated by the borough engineer that the local authorities will probably adopt measures for the abandonment of the existing privies along this highway. About every street in the borough is now sewered in districts A and B and it would appear that extensions to the existing sewers here will not be required, except for short distances only where improved surface drainage or the connection of some single house might require it.

In district C, it is proposed to construct a thirty-six inch sewer outlet into the river at the extreme south end of the borough. Connected with this main is to be an eighteen inch drain in an alley between Third and Fourth avenues and a fifteen inch drain in the alley between Fourth and Fifth avenues. Roof and storm water are to be admitted to these sewers and sewage also, if permitted.

The borough is reported to be bonded practically to the constitutional limit of indebtedness under the present valuation, which valuation will probably be increased of necessity in the near future. The estimated cost of the proposed sewers is twelve thousand dollars and contribution towards this expense will be made in some form, either as an assessment or otherwise, by the Plate Glass Company, which company exercises a lively interest in the material welfare of the borough. It is entirely beyond the bounds of possibility for the municipality to assume the expense of the construction of a sewage disposal plant at this time. When this becomes absolutely necessary of immediate accomplishment, either an independent sanitary system must be installed for the collection of sewage only, or a dry weather intercepting sewer of small capacity must be provided to collect the dry weather flow of sewage from the existing sewer outlet and deliver it to the pump well, where it should be raised to a purification plant. Under this arrangement, during storms, mingled sewage and storm water would of course pass into the river. However, by this arrangement, during high stages of the river, all sewage would go into the stream.

It is only by the building of a separate system of sewers that sewage at all times and under all conditions could be kept out of the river and be thoroughly purified. The cost of such a plant might not exceed fifty thousand dollars for the sewers and thirty thousand dollars for the purification works.

In view of the fact that necessity for storm water drainage has been shown but that the necessity, in the interest of the public health for some other method of disposal of excrement in district C, than is now used, has not been shown, and because the conduits which are now in existence can be turned over exclusively for the removal of storm water in the future when the borough shall be obliged to devise a system of sewerage for the removal of sewage only and its purification, it has been unanimously agreed that the interests of the public health demand that no more sewage be put into the river than can be discharged by the existing sewers.

Ford City is one of the contributing sources of constant pollution to the water supply of the city of Pittsburg and other municipalities below and it is one of the menaces, the removal of which is demanded by the interests of the public health. The borough is about forty miles above Pittsburg, and this disposal of sewage, discharged from the borough sewers, makes possible its reaching the intake of the Pittsburg water system and being introduced into the said system within a few hours from the time it is admitted to the river at Ford City. After the new filtration plant at Pittsburg is put in use, it is true that the menace will have been reduced to a minimum. Nevertheless, in case of some accident to the filter plant requiring the immediate recourse to raw river water, even greater loss of life, by reason of the sewage in the river than is now the case, might easily follow. This has been observed to be the fact in numerous instances and may be attributed to the fact, that when people know they are drinking sewage polluted water, they often wisely adopt precautionary measures, but after having been given to understand that there is no necessity for such precautionary measures, owing to the filtration of the supply, they abandon such measures and hence are caught unawares in case of accidental introduction of sewage polluted water into the water pipe system.

It has been unanimously agreed that the interests of the public health demand that a permit be granted to the borough of Ford City, and it is herein and hereby granted to said borough to extend its sewer system and to discharge the sewage therefrom into the Allegheny river under the following conditions and stipulations:

FIRST: That permission to discharge sewage into the Allegheny river from the borough sewers shall cease on April first, one thousand nine hundred and eight.

SECOND: If on April first, one thousand nine hundred and eight, the provisions of this permit shall have been complied with, the Commissioner of Health may extend the time in which the borough sewers may be permitted to discharge into the Allegheny river, provided at that time, in his opinion, the interests of the public health demand such extension of time.

THIRD: The borough officials shall prepare a plan for a system of separate sewers and sewage purification works for the entire borough and submit the same to the Commissioner of Health for his consideration and approval on or before April first, one thousand nine hundred and eight.

FOURTH: That the work of extending the sewerage system of the borough according to plans proposed, is approved under condition that all sewage shall be excluded from said extensions.

FIFTH: No pathological material from any laboratory shall be permitted to discharge into the system. The proper authorities shall cause these wastes to be incinerated on the premises.

The attention of the borough authorities is called to the fact that the object of this permit is to prevent added pollution of the river by the borough and to bring about at as early a date as practicable, the cessation of the pollution of the river by sewage from the municipality. This is in keeping with the policy which has prevailed and is to prevail in the entire valley of the Allegheny river.

Harrisburg, Pa., February 20th, 1907.

FORD CITY, ARMSTRONG COUNTY.

This application was made by the borough of Ford City and is for permission to build sanitary sewers in district C of said borough and to discharge the sewage therefrom into the Allegheny river.

It appears that the borough of Ford City is an industrial community of about four thousand population and that its growth during the last decade has been rapid. The population has nearly doubled during this time.

The town is situated on the east bank of the Allegheny river and on the Buffalo and Allegheny Valley Division of the Pennsylvania Railroad system about four miles below Kittanning, the county seat.

The area is small, three hundred and nine acres, which is hemmed in between the hills on one side and the river on the other, and here, sometime since, the Pittsburg Plate Glass Company located its factories, three, four and five, and laid out and built up the town. These works now give employment to about twenty-five hundred men. The Ford City China Company, whose plant is also located in the borough, employs about three hundred hands.

The municipal territory averages a maximum width of eighteen hundred feet only and narrows down to a point in the south-eastern part of the borough Along the river bank and distant therefrom about three hundred feet extend the railroad tracks and between them and the river are located the manufactories.

The public water supply is furnished by the municipality principally, and will be wholly in the near future. Prior to the incorporation of the borough, the Plate Glass Company had laid pipes in some of the streets and supplied the citizens with water therefrom, these pipes being a part of the water works system of the company's works. The water at that time was pumped from the river into a brick lined reservoir holding about one million gallons and located on the hills. From this reservoir an independent supply main, twelve inches in diameter delivered the water to the town. In the year one thousand eight hundred and ninety-nine, at the date of the incorporation of the borough, the company sold the water pipes in the streets to the borough but continued to supply water to the people by means of these pipes under special contract with the borough authorities, which was continued until the year one thousand nine hundred and five, when the municipality erected a pumping station and sunk a filtering well in the bank of the river at the foot of Thirteenth street, which is near the upper boundary of the town and laid a system of water pipes in the unpiped streets of the borough. At this time the municipality also purchased the reservoir on the hill.

The filtering well at the new pumping station appeared to give water of a satisfactory quality, but it was insufficient in quantity, and hence during the summer of one thousand nine hundred and six, an additional well was provided near the first one but on the shore of the river. The final test of this well has not yet been made. The deficiency in the municipal supply has been made up by purchasing the water from the Plate Glass Company under special arrangements.

There are a few wells in the borough, possibly a dozen. The probability is that there will never be a large number of private wells, because the streets ar quite thoroughly piped and public water is available to the citizens.

It should be noted that there are comparatively few privies and cess-pools in the town. About ninety per cent. of the municipal territory is sewered. In the unsewered portion, which is the part for which application for sewers has been submitted and is now under consideration herein, the properties are provided with ordinary privy vaults, the waste water being discharged onto the surface of the ground in most cases.

Ford City was established and built up by the Plate Glass Company, so in common with the other public utilities, the present sewer system was designed and built by said company prior to the town becoming a borough. At the date of the incorporation of Ford City borough the company turned the sewers over to the municipality.

Owing to the limited area and topography of the town, its being a level plateau elevated about fifteen to eighteen feet above the ordinary stage of the river, but subject to entire inundation during periods of extreme freshets, the problem of most importance has been the removal of surface water from this area, which comes down in torrents during rain falls from the precipitous hillsides and would pond up to the inconvenience and damage of individual and the public, were it not speedily removed from off the plateau into the river. Hence surface drainage was considered paramount and this dictated the construction of a combined system of sewers to take both storm water and sewage.

The engineer who designed the system found it economical to provide for three outlets into the river, one for the lower, one for the central and the other for the upper part. The two last named outlets have been constructed in conformity with this general plan. The drain which serves the central part of Ford City, known as district B, is fifty-four inches in diameter and serves one hundred and seventy-one acres. It empties into the river at the foot of Eighth street and comprises a system of about three and eight-tenths miles. The sizes range from fifty-four to twelve inches in diameter, and connected with these sewers is an approximate population of twenty-five hundred.

The upper district, known as district A, comprises sixty-three acres and is served by a forty-eight inch outlet which empties into the river at the foot of Eleventh street. It serves a population of about one thousand people and comprises a system of one and three-tenths miles, the sewers ranging in size from forty to twelve inches in diameter.

The third sewer outlet has not yet been built. It was designed to serve district C, comprising seventy-four acres, of which thirty-four lie east of the railroad and will be built upon. Here at present there are living about five hundred people. The area is extremely flat and swampy, the water coming down from the hillsides, or that falls from the clouds directly on it, remains in low places, becames stagnant and a source of discomfort to the neighborhood. Strong odors emanate from the swales, they are said to be mosquito breeders and the petitioners represent that the conditions are entirely insanitary and a menace to public health.

Surface drainage from this area is demanded even more than the removal of sewage. In fact, were it not for the necessity of providing for underground drainage for the removal of the water, probably application would not be made at this time for sewers for the disposal of sewage only. There is no assurance that the present method of disposal of excrement will be abandoned, should the sewers petitioned for be approved and constructed. However, as a rule, sewerage facilities in the other two districts of the borough have been very generally availed of, the principal exception obtains with the properties on Seventh avenue, which is at the foot of the hills. It is stated by the borough engineer that the local authorities will probably adopt measures for the abandonment of the existing privies along this highway. About every street in the borough is now sewered in district A and B, and it would appear that extensions to the existing sewers here will not be required, except for short distances only where improved surface drainage or the connection of some single house might require it.

In district S it is proposed to construct a thirty-six inch sewer outlet into the river at the extreme south end of the borough. Connected with this main is to be an eighteen inch drain in any alley bettwen Third and Fourth avenues and a fifteen inch drain in the alley between Fourth and Fifth avenues. Roof and storm water are to be admitted to these sewers, and sewage also if permitted.

The borough is reported to be bonded practically to the constitutional limit of indebtedness, under the present valuation, which valuation will probably be increased of necessity in the near future. The estimated cost of the proposed sewers is twelve thousand dollars and contribution towards this expense will be made in some form, either as an assessment or otherwise, by the Plate Glass Company, which company exercises a lively interest in the material welfare of the borough. It is entirely beyond the bounds of possibility for the municipality to assume the expense of the construction of a sewage disposal plant at this time. When this becomes necessary of immediate accomplishment, either an independent sanitary system must be installed for the collection of sewage only, or a dry weather intercepting sewer of small capacity must be provided to collect the dry weather flow of sewage from the existing sewer outlet and deliver it to the pump well, where it should be raised to a purification plant. Under this arrangement, during storms mingled sewage and storm water would of course pass into the river. However, by this arrangement, during high stages of the river, all sewage would go into the stream.

It is only by the building of a separate system of sewers, that sewage at all times and under all conditions could be kept out of the river and be thoroughly purified. The cost of such a plant might not exceed fifty thousand dollars for the sewers and thirty thousand dollars for the purification works.

In view of the fact that necessity for storm water drainage has been shown and that the necessity for some other method of disposal of excrement in district C than is now used, has not been shown, it would appear that the borough could well get along without the construction of separate sewers in the district. However, the proposed drains will be built by the Plate Glass Company, which company originally laid out the town and built sewers therein. When the portion of the town not sewered was sold by said company to other private interests, it was with the understanding that on the condition that when public necessity required it, the said Plate Glass Company would build sewers for the removal of both sewage and storm water in the territory. Therefore, in order to comply with the terms of this agreement, the Plate Glass Company will be obliged to defer building storm drains only. Hence the borough requests that in compliance with the suggestions of the Commissioner of Health the proposed storm drains be laid in trenches in which sanitary sewers be also laid, that permission be granted the borough to build sanitary sewers in connection with the construction of storm drains in district C. Further because it is probable that the buildings in this district will not be generally connected with said sanitary sewers, and therefore, the pollution of the Allegheny river will not be materially increased, the borough further requests, through its engineer, that permission to discharge sewage into the river, from the proposed sanitary sewers be granted until such time as the boroughs on the river above and below Ford City are required by the State to discontinue the discharge of their sewage into said river.

Ford City is one of the contributing sources of constant pollution of the water supply of the city of Pittsburg and other municipalities below and it is one of the menaces the removal of which is demanded by the interests of the public health. The borough is about forty miles above Pittsburg, and this disposal of sewage discharged from the borough sewers makes possible its reaching the intake of the Pittsburg water system and being introduced into the said system within a few hours from the time it is admitted to the river at Ford City. After the new filtration plant at Pittsburg is put in use, it is true that the menace will have been reduced to a minimum; nevertheless, in case of some accident to the filter plant requiring the immediate recourse to raw river water, even greater loss of life, by reason of the sewage in the

river, than is now the case, might easily follow. This has been observed to be the fact in numerous instances and may be attributed to the fact that when people know they are drinking sewage polluted water they often wisely adopt precautionary measures, but after having been given to understand that there is no necessity for such precautionary measures, owing to the filtration of the supply, they abandon such measures and hence are caught unawares in case of accidental introduction of sewage polluted water into the water pipe system.

It has been determined that the interests of the public health require that a permit be granted and such permit is hereby and herein granted to the borough of Ford City to extend its sewer system in district C, and to discharge the sewage therefrom into the Allegheny river under the following conditions and stipulations:

FIRST: That permission to discharge sewage into the Allegheny river from the borough sewers shall cease on May first, one thousand nine hundred and nine, but that on said date, provided the said conditions of this permit are complied with, and provided that the neighboring boroughs above and below Ford City on the Allegheny river have not been required by the State to discontinue the discharge of sewage into said river, the Commissioner of Health will if the interests of the public health demand it, extend the time in which the sewage of Ford City shall be discharged into the Allegheny river.

SECOND: That plans for the proposed sanitary sewers in district C shall be prepared and filed with the Department of Health subject to the approval of the Commissioner, before the sewers or any of them are built.

THIRD: The borough officials shall have a plan prepared for a system of interception of the sewage of the borough and its conveyance to some site suitable for the erection of sewage purification works for the entire borough, which plan shall be submitted to the Commissioner of Health for his consideration and approval on or before April first, one thousand nine hundred and eight. The borough shall, on or before the time when the State shall determine it to be necessary for the borough of Ford City to discontinue the discharge of sewage into the river, and on request by the Commissioner of Health, prepare detailed plans for sewage purification works and submit the same to the Department of Health for approval.

FOURTH: No pathological material from any laboratory shall be permitted to discharge into the system. The proper authorities shall cause these wastes to be incinerated on the premises.

Harrisburg, Pa., June 10th, 1907.

FOREST CITY, SUSQUEHANNA COUNTY.

This application was made by the borough of Forest City, Susquehanna county, and is for permission to install a system of sewers and to discharge sewage therefrom into the Lackawanna river within the limits of the borough.

It appears that the borough of Forest City occupies the extreme southeastern corner of Susequehanna county. It is bounded on the north and west by Clifford township, said county; on the east by Wayne county and Clinton township therein, and on the south by Lackawanna county and Vandlin borough therein. The Lackawanna river flowing southerly follows quite closely the boundary line between Susquehanna and Wayne counties, a short portion of its course being in the northern part of the borough, but the remainder lying in Clinton township, although at one point near the southern boundary the stream touches the borough line again. Practically, Forest City lies on the west bank of the river about twenty-one miles above the city of Scranton.

The Jefferson branch of the Erie Railroad passes through the town at the foot of the hills and on what is practically the west bank of the river. The tracks of this road are also used by the Delaware and Hudson River Railroad. On the east bank in Clinton township are the tracks of the New York, Ontario and Western Railroad and here opposite Forest City is the village of Browndale, population about three hundred and fifty. There is a proposition to bridge the valley over the railroads for the convenience of highway travel. If this were done, it would bring Forest City in close communication with a large extent of farming territory in Wayne county. At present the borough is dependent wholly upon local coal mining operations. Its population is about fifty-five hundred. In nineteen hundred it was four thousand two hundred and seventy-nine and ten years previous two thousand three hundred and nineteen. The incorporated territory is rectangular in shape, being about one and a half miles long and about three-fifths of a mile wide back from the river. The built up portion of the town lies on the hillsides sloping steeply into the valley, the foot of the hills being separated from the river by a level stretch of land approximately five hundred feet in width. Said portion contains about ninety acres and is comprised between North and South streets extending up the slopes, Lackawanna street on the hill and Railroad street in the valley. Main street which is parallel to the latter streets is the principal thoroughfare in the town.

It follows the valley down stream through different municipalities to Scranton. Along this thoroughfare there are some houses in Forest City south of South street.

The surface drainage of most of the borough is directly into the river through various culverts under the Erie Railroad at the foot of the hills. A small undeveloped district in the northwestern corner of the borough is drained by a small run which enters the river above the borough limits. West of Lackawanna street and south of South street the borough territory is drained by a run which also drains a part of Clifford township and Vandling borough, said run passing through the southeast corner of Forest City northeasterly to the river. It is known as Thompson run.

The principal industry is owned by the Hillside Coal and Iron Company. This corporation operates two breakers within the borough limits. All of Forest City is underlaid by coal. The Forest City breaker is on the west side of the Erie Railroad, near the foot of South street, and the Clifford breaker is located west of said railroad, north of North street. There are reported to be seven hundred and fifty men employed at the former and four hundred and fifty men at the latter breaker.

Along the railroad about fifteen hundred feet north of the Clifford breaker is the mill of the Hayne Silk Company, where forty-two hands are employed.

Between the said breakers on the flats there is a wet culm dump about half a mile long, extending from the railroad to the cinder and waste coal dyke near the river.

The industrial plants use public water for stream purposes and river water for washing coal.

The water works are owned and operated by the Consolidated Water Company and the source is Brace brook, a stream in Wayne county, entering the Lackawanna river just about Forest City. On this brook there is a reservoir which supplies the town by gravity. The watershed is sparsely populated and, being above the coal measures, yields a water of satisfactory quality. During the summer months, this supply is supplemented by Lackawanna river water, which is pumped from a dam on the river at a point about opposite the silk mill. At the present time there are no coal mines in operation on the watershed above this dam, but four and five-tenths miles above is the borough of Jermyn, in which there are sources of sewage pollution which menace public health in Forest City when the river water is used by the water company. On the day of the Department's inspection, nearly the entire flow of the river was being pumped into the water works system. The total daily consumption amounts to about one million two hundred thousand gallons in the boroughs of Forest City and Vandling. A large part of this water is used by the collieries. Local records do not show an unusual amount of typhoid fever. It is reported that there are not over twenty-five individual wells in use in Forest City.

The top soil is a mixture of clay and gravel and appears to be quite impervious. A greater portion of the kitchen drainage and some closet drainage is discharged into the street gutters. The streets have not been improved and in some cases, owing to the scouring effect of rain water, deep gullies have been washed out in the streets. These gutters lead to the various culverts under the railroad.

The town is without a system of sewers. The surface water and gutter sewage of the built up portion of the town is emptied onto the culm dump above mentioned, through openings which in order up stream are as follows:

First, a twenty-four inch culvert under the railroad at the cold storage plant near the foot of South street. This receives sewage and storm water from the gutters in Railroad and South streets; second, a twenty-four inch pipe culvert under the railroad at the foot of Depot street. It receives surface and gutter drainage from Depot street and a part of Railroad street. There is a small pipe sewer in Main street which extends about a half a block northerly and empties into the Depot street gutter; third, there is a twenty-four inch pipe underneath the railroad at the foot of Center street. It receives the discharge of a short private sewer in Main street and it is reported that a hotel and the borough building drain into the Center street gutters; fourth, a twelve inch by fifteen inch box culvert under the railroad a short distance south of the Erie Depot. It is an outlet for private sewers from some buildings on Main street and elsewhere. Fifth, two twenty-four inch pipes underneath the railroad immediately north of the Erie depot. They receive gutter sewage and storm water from Erie, Grand, Railroad and Main streets, and sixth, a two foot by three foot masonry culvert under the railroad at the foot of North street. It receives drainage from North street and from a ditch which takes the gravity discharge from a mine drift near and east of Main street.

These outlets discharge surface water and gutter sewage on to the culm banks of the Hillside Coal and Iron Company. The dyke along the river is about thirty feet high at the highest point. It extends from the lower to the upper breaker. The culm is sluiced into this basin and is about twenty feet deep near the breakers and considerably less near the dyke. The sewage and drainage must pass over or through this filter before reaching the river. There

was very little flow through the opening of the dyke into the river on the day of the Department's inspection and no nuisance was apparent after the sewage reached the culm basin.

On January sixteenth, nineteen hundred and seven, the borough council authorized a special election for the purpose of obtaining the assent of the voters to an increase of the indebtedness of the borough in the sum of twelve thousand dollars for the purpose of constructing a sewer system, which election was subsequently had and the increase authorized.

The petitioners state in the application that the proposed system is for the combined use of sewage and surface water. The main outfall sewer is to be twenty-four inches in diameter and is to discharge on the lowland near the river opposite Forest City breaker. The main intercepting sewers leading out of this outfall, which begins at Depot and Railroad streets, comprise a fifteen inch pipe north and south in Railroad street, having a slope of about one per cent., and a fifteen inch pipe in Main street. The lateral sewers on the streets running north and south are uniformly eight inches in diameter. They are designed to empty into sewers from eight to fifteen inches in diameter which are to be laid in the steep hillside highways. The plan shows thirty-seven inlets for storm water.

The system is to receive mine drainage at the mine opening in the rear of the Clifford breaker. The flow here is said to be five hundred gallons per minute. It is a gravity flow. The water from the Forest City breaker is pumped. The amount is said to be double that discharged from the Clifford breaker. Both volumes are to be taken into the sewer system.

The Lackawanna river rises in numerous small lakes or ponds in Susquehanna and Wayne counties, about thirteen miles above Forest City. The drainage area comprises about forty-six square miles at this point. The coal measures were supposed to end at Forest City, but recent borings have developed coal at Uniondale, five miles above Forest City, in quantities sufficient to warrant mining. It is possible that in the future mining operations may be established.

In and below the borough within two miles of the proposed sewer outlets, there are nine coal mines.

Below Forest City the river flows through a thickly populated valley devoted to coal mining and manufacture. Located along the river to its point of discharge into the Susquehanna, are the cities of Carbondale and Scranton and the boroughs of Uniondale, Forest City, Vandling, Mayfield, Jermyn, Archbald, Blakely, Winton, Olyphant, Dickson City, Throop, Dunmore, Taylor, Old Forge, Moosic and Duryea. These places had a population in nineteen hundred of about one hundred and eighty-two thousand, which has probably increased to two hundred thousand at the present time.

The sewage from this population reaches the river either directly through sewers or indirectly through street gutters. Several of the municipalities are planning new sewerage or extensions of old systems.

In the Lackawanna Valley there are at least eighty mines. The drainage from them is into the stream and the waters are so acid as to be rendered entirely unsuitable for manufacturing purposes. The depositing coal dust which comes from the coal breakers and from the washeries in use to reclaim the valuable portions of the old waste coal piles has raised the bed of the Lackawanna river several feet in places. Damaging floods have frequently occurred due to this and other obstructions of the channel in the lower part of the city of Scranton. The culm acts as a coagulant upon sewage matters in the river and precipitates them and the acid mine waters operate as germicides on the microscopic organisms discharged into the river by sewers. These processes of clarification and purification are not complete or perfect, in all probability, and the organic sewage matter precipitated and buried with the culm in the bed of the channel is, during freshets, scoured out and removed bodily down stream many miles. It is during this stirring up period that the public health is menaced in those down stream municipalities where the public water supply is drawn from the river. At Berwick and at Danville, and again at Sunbury, and so on, there are water works intakes.

It is estimated that the flow of the Lackawanna river during the past dry season was practically all mine water and sewage, since there was very little water flowing over the dam in the river at Forest City. From inspections made by the Department and a study of the valley it would appear that the average pumpage from the mines of the district is about fourteen hundred gallons per minute. This does not include the gravity discharge of mine water from open drifts. Assuming that there are in the neighborhood of eighty mines in daily operation, the pumpage into the river at this rate would be equivalent to about one hundred and sixty million gallons per day.

The fact that this water is pumped into the Lackawanna or its tributaries, should not be taken to indicate the volume of flow of the Lackawanna at its mouth. Coal has been mined under the river channel in many places so that the surface water filters down through the earth into the mine. Consequently the river water or the mine water to a considerable degree is pumped over and over again. What portion of the water flows down stream and what part filters down into the mines to be pumped out again has not been measured.

Many of the mines are connected underground. If pumping operations should be confined to one or more common points and the mine water raised there and emptied into the river, or should there be an abandonment of mines in any one section of the region, this would be likely to affect the method of sewage disposal in use and nuisances might be created at points where now a nuisance may not exist by reason of the discharge of sewage into the waters of the State.

Furthermore, new laws may be enacted and a more rigid administration of present laws relative to the depositing of culm in streams. While it is certain that the volumes of sewage daily put into the stream in the Lackawanna valley would, if it were not for the mining operations and the wastes therefrom, cause a public nuisance in the region beyond a point of doubt, it is equally certain that there is a limit somewhere to the amount of sewage which may be put into the streams of this region beyond which a great nuisance would exist. If the mitigating circumstances were disturbed sufficiently, some other method of disposal of sewage would be required or at least changes in existing methods would be demanded. It is well in a matter involving so large a public expenditure as does a sewerage system, for the promoters to take into consideration both probabilities and possibilities during the period for which the sewers are to be built.

It is quite possible that as represented by the petitioners, the mine drainage proposed to be delivered to the Forest City sewers will aid in the purification of sewage. Further, it is quite possible that this mine drainage might be led to structures so designed as to permit of the regulation and control of these processes. If this should be found to be a desirable attainment, the work would be rendered more economical and efficient if sewage only were permitted to enter the sewers. Certainly storm water would be a distributing element in such works.

Should the subject of sewage disposal for the chain of municipalities along the Lackawanna river be considered to the extent of a joint intercepting sewer and the discharge of the sewage into the river at one or more common points, this project would dictate that storm water be excluded from the intercepting sewer. The proposed sewers are to receive both sewage and storm water. The laterals are to have steep grades and hence high velocities, and they are to discharge into trunk sewers of relatively flat grade and low velocity. The system as designed is too large for sanitary sewers and not large enough for storm sewers. The carrying capacity of the sewer main is in the neighborhood of forty cubic feet while the area draining to it is one hundred acres. There is every indication that if the inlets were to admit even one-third of the storm water, that there would be an overflowing at plumbing fixtures along Main street.

There is no apparent need of a combined system, sanitary sewers can be built along the lines laid out but of reduced size and so at less cost. The storm water should be led directly down the hillside through shallow drains to the culverts under the railroad, which culverts may need rebuilding in some places. Many of the street gutters are deep enough to receive shallow drain pipes and afford room for sufficient covering.

It has been unanimously agreed that a permit be granted and it is hereby and herein granted to Forest City borough to construct a system of sewers under the following conditions:

FIRST: That all roof and storm water shall be excluded from the system but mine water may be temporarily admitted until such time as the State Department of Health may decide that it is necessary for some other disposal of mine drainage than into the sanitary sewer system.

SECOND: That before the sanitary sewers or any part of the system is built the borough shall submit a plan thereof showing the entire system, the sizes and grades, to the Commissioner of Health for approval.

Particular attention shall be paid to the outfall sewer and the point of discharge with respect to existing conditions and with respect to possible future disposal works. All of which will be considered by the Commissioner of Health, and if the interests of the public health demand it, a permit will be issued for the temporary discharge of sewage into the Lackawanna river under certain conditions and stipulations. But in no event shall the time for such discharge be over two years from the date of the approval of the sewer plans by the Commissioner of Health. However, at the expiration of that time if the terms of the permit shall have been complied with, then the Commissioner of Health may extend the time and fix the date when sewage shall cease to be discharged into the Lackawanna river at Forest City, having always in mind the policy of the State with respect to the disposal of the sewage into the river by other municipalities in the Lackawanna valley.

Harrisburg, Pa., December 20, 1907.

GREENVILLE, MERCER COUNTY.

This application was made by the borough of Greenville, Mercer county, and is for permission to construct works for the purification of the sewage of said borough and to discharge the effluent therefrom into the waters of the State.

It appears that on July third, one thousand nine hundred and six, the Commissioner of Health issued a permit to the borough of Greenville, Mercer county, Pennsylvania, to extend the sewer system, and to build sewers in the West End district and to discharge sewage therefrom into the Shenango river outside of the limits of the borough in the township of West Salem and the township of Hempfield, in conformity with an application duly made therefor by the proper authorities.

Among other conditions stipulated in the permit were the following:

"That before the West Side terminal sewer is built the borough shall prepare and submit to the State Commissioner of Health for approval a preliminary plan of the interception of all of the sewage of the West Side and its conveyance to some point for treatment, and this plan as approved, modified and amended by the Commissioner of Health shall be conformed to in the building of the West Side terminal sewer.

"Second, the sewage from the proposed sewer in the West Side district may be temporarily emptied into the Shenango river, but this permit to so discharge the sewage shall cease on the first day of May, nineteen hundred and nine.

"Third, detail plans for the sewage treatment works for the sewage of the West Side of the borough shall be prepared and submitted by said borough to the Commissioner of Health on or before the construction of the West Side terminal sewer. These works shall be so designed that additions may be made thereto if practicable for the treatment of the sewage from the sewer system to be extended on the East Side. The Commissioner of Health may modify, amend or approve the plan, and fix the date for their construction which shall not be later than May first, nineteen hundred and nine, at which time said works shall have been constructed, and the sewage of the West Side delivered to them for purification.

"Fourth, that storm water shall be excluded from the sewers except such water as may be found desirable to admit for flushing purposes."

In conformity with the requirements of said permit it appears that the borough employed Mr. George H. Pierson, Consulting Engineer, of New York City, to prepare plans for sewage purification works. On January thirtieth, one thousand nine hundred and seven, said plans were adopted by the town council and it was unanimously voted to submit them to the Commissioner of Health for approval.

The proposed plans call for the location of the purification works on the east bank of the Shenango river in Hempfield township near the outlet of the present eighteen inch outfall sewer which is the lower of the two outfalls serving the East Side of the borough. It is known as the Mercer street outfall. Here it is proposed to erect a plant capable of a once treating all of the sewage of the borough. It has been found possible by means of reconstructing the present outfall sewers, to deliver the sewage from the East Side and from the West Side by gravity to the plant.

The plant contemplated the discharge of the West Side sewage through a twenty inch sewer and an inverted syphon under the river into the present eighteen inch Race street outfall, from which point a new outfall is to be laid along the east bank of the river to the proposed disposal works. Details of the inverted syphon have not yet been submitted.

The plant is to comprise septic tanks, contact beds and sand filters. The flow line in the septic tank is elevation fifty-eight. The bottom of the septic tanks is to be elevation fifty-one. The effluent from the tanks is to be delivered onto the surface of the contact beds whose flow line when full will be elevation fifty-eight, and whose depth will be three feet. The effluent from these beds is to be delivered onto the sand filters whose surface is to be fifty-five and whose depth will be two feet. The effluent of the sand filters is to be discharged from the plant at elevation fifty-three. Thus it appears that the vertical height travelled by the sewage from its entrance to exit from the plant is to be five feet only.

The river at its ordinary stage is fifty-one. Freshet flows raise this to fifty-four. Once only in the recollection of the oldest inhabitant did the water rise higher than about fifty-four. That was during a freshet and ice gorge when the elevation reached was sixty for a few minutes.

So that it appears that during annual freshets the river water will rise about one foot above the bottom of the sand filters and put them out of commission. Flood gates should be provided on the main and other effluent pipes from the sand filters to prevent river water from backflooding the sand filters. It is intended that during freshets of annual occurrence the contact beds only shall be used, the effluent therefrom being discharged directly into the river. The septic tank bottom being lower than the sand filters, cannot be drained or the sediment removed by gravity. The plans contemplate the use of a centrifugal pump operated by a gas engine for these purposes.

Should an extraordinary freshet occur again the entire plant would be submerged were it not for the provision in the plans whereby the entire plant is to be surrounded by masonry wall carried up to an elevation of sixty-two, which is two feet above the highest water ever known.

In order to deliver the sewage of the borough to the works by gravity the Mercer street outfall is to be reconstructed from Park avenue to the plant, a distance of about five thousand feet. The Race street outlet is to be extended from its present outlet to the plant a distance of about two thousand eight hundred feet. Both of these sewers are to have a grade of sufficient inclination to maintain a cleansing velocity. The minimum grade will be fifteen-hundredths per cent.

The disposal works proposed are designed on the basis of purifying daily five hundred thousand gallons of domestic sewage.

The crude sewage is to enter the works through a grit chamber provided with a screen, whose object is to be to prevent the admission to the septic tanks of the larger solids or refuse matter which cannot be readily broken down by bacterial action. The screens are to be one-quarter inch bars spaced one inch on the centers. The grit chamber is about five feet wide and from five to seven feet deep and extends across the end of the septic tank. The tank is divided into two compartments, each compartment being twenty-five feet wide and one hundred feet long, side by side. The sewage is to be delivered into these tanks by means of weirs, one in each compartment, extending across the entire width of the inlet end. The elevation of the weir is fifty-eight. By means of a gate in a division wall in the grit chamber the sewage may be turned into either one of the septic tanks at will.

Each compartment is provided with a baffle board across the entire width of the outlet end and two feet therefrom, submerged to mid-depth, which baffle board is to operate as a non-disturbing outlet device, whereby the effluent from the tank will be drawn at mid-depth and passed over an outlet weir across the entire width of each compartment into a collecting chamber three feet wide and three feet deep, extending across the outlet end of both compartments.

The outside walls of the tank are to be carried up to elevation sixty-two, upon which is to rest an ordinary wooden truss roof.

The bottom of the septic tanks are to be level, or pitch slightly to the sump in the grit chamber where the sludge pump is to be installed in a small building to be erected for the purpose. Whenever it becomes necessary to drain a compartment the liquid is to be pumped from it into the twin compartment, but the sludge and sediment is to be forced onto a drying area on the outside, plans of which have not yet been prepared. The combined capacity of the tanks is two hundred and sixty thousand gallons, which is equivalent to about twelve hours' displacement when five hundred thousand gallons daily are being delivered to the plant.

The contact beds are to be four in number and taken together will occupy a space adjacent to the septic tanks two hundred feet long and one hundred feet wide. Each bed is to be fifty feet wide and one hundred feet long. The bottom is to be natural clay exposed on excavation. The sides and division walls of each compartment are to be of concrete. The sewage is to be delivered onto the surface of the beds by wooden troughs which are to rest on and be imbedded in the filling material.

The filling material is to comprise broken stone or coarse gravel, graded from the coarser on the bottom to the finer on the top, of such sizes that the largest shall pass through a three inch ring and the smallest shall not be rejected by a one-half inch ring.

The underdrains on the bottom are to be six inch horse shoe tile and to converge to one point in the corner of each bed where facilities are to be provided for the cleaning out of the underdrains whenever required.

The filling and emptying of sewage of each compartment or bed is to be accomplished by means of an automatic controlling apparatus of the air-lock type, which is designed to take the place of manual manipulation of gates and valves. By it sewage will be directed into one bed until it be filled and then the flow will be turned onto another bed, and so on through the cycle of the four beds, et cetera. The apparatus is to be housed and to be under the supervision of an attendant who is to be in constant care of the plant. There are by-passers and valves provided so that in case some accident happens to the apparatus said gates and valves may be manipulated by the attendant and the plant kept in commission.

The total surface area of the four beds is about half an acre. When operated at about the rate daily for which the plant is designed, there will be in the neighborhood of eight hours contact which has been found to be good practice in some instances.

The sand filters correspond exactly in size and arrangement with the contact beds. Contact bed number one is designed to be operated in conjunction with sand filter number one, and so forth each contact bed having its complement in a particular sand filter. Assuming that the voids in the contant bed will equal about thirty-five per cent., there will be a dose of forty thousand gallons of sewage delivered on an average of every eight hours to each sand filter which is equivalent to a rate of five hundred thousand gallons per acre daily when the plant is run at its estimated capacity. This rate is not by any means impossible, provided due care is exercised in the mainte-

nance of the surface of the said filter. The sewage is to be delivered onto the surface by troughs which are to rest wholly upon the surface, so that nowhere will there be a less depth than two feet of sand. The bottom of the filter is to rest on the natural clay, but the sides and division walls are to be of concrete masonry.

Both the sand and contact beds are uncovered.

The only arrangement by which sewage from this plant may reach the stream in an unpurified condition is through the main underdrain from the sand filters into which the contact bed effluent must pass and be delivered to the stream during high water periods. This cannot be avoided, however, and at such times the bacterial contents of the stream would be high from unpreventable sources of contamination.

It is presupposed that the forth-coming detail plans of the sludge drying area will be adequate to prevent pollution of the stream from this source. Ample land should be purchased or acquired by the borough to provide for any future extensions of the plant and for the proper disposal of all sludge.

The borough is fortunate in being able to deliver sewage by gravity to disposal works. The design is an effort to accomplish this in which vertical height is below the minimum desired. It is possible, however, for good purification to be obtained under these adverse conditions, provided three things be done. First, that the works be constructed under the rigid direction and supervision of an engineer skilled in this kind of work. Samples of the sand to be used should be submitted to the Department for approval, the automatic apparatus should be purchased under guarantee that it shall do the work and tests for this purpose of sufficient duration should be provided because the successful operation of the plant as now designed depends in a large measure upon the apparatus. Second, that the borough authorities should take immediate action to exclude all roof water and leakage into the sewer system. Otherwise, the plant as now designed will not be sufficient in capacity to successfully purify the sewage at all times. Third, that an attendant must be stationed at the disposal works and must be a man capable of understanding the principles upon which sewage is purified by the processes proposed, and capable of learning how to maintain the plant in order to assure best results.

Even if these things be done, it may be found that unknown conditions will require additions or extensions to the plant, which additions and extensions must be made if required by the Commissioner of Health.

It has been unanimously agreed that the interests of the public health require that approval be given and it is hereby and herein given to the plans of the proposed sewage disposal works under the following conditions and stipulations:

FIRST: That the system herein approved for sewage disposal works for the purification of the sewage of Greenville shall be constructed not later than May first, one thousand nine hundred and nine, and that detail plans of the plant as constructed shall be filed with the Commissioner of Health when the plant is completed.

SECOND: That the proposed syphon under the river shall not be built until detail plans thereof have been submitted to and approved by the Commissioner of Health.

THIRD: That the depth of the sand filters shall not be less than three feet, the bottom thereof to be at elevation fifty-three as now designated. Before the sand filters are constructed samples of the sand to be used shall be submitted to the Commissioner of Health for approval.

FOURTH: Flood gates shall be placed on the outlet pipe or pipes from the plant to prevent backflooding thereof, vent pipes shall be provided for the escape of explosive gases at the septic tanks, and the entire works shall be constructed under the direction and supervision of an engineer skilled in this kind of work.

FIFTH: Ample land shall be purchased by the borough for the proposed sewage disposal works and plans for the drying area upon which sludge is to be deposited shall be prepared and submitted to the Commissioner of Health for approval on or before the first day of January, one thousand nine hundred and eight.

SIXTH: The borough authorities shall take immediate action and shall cause to be excluded from the sewer system all roof and storm water.

SEVENTH: An attendant, or caretaker, shall be employed by the borough whose duty it shall be to devote all of his time in superintending the disposal works and a weekly report shall be made by him to the Commissioner of Health, said report to be on blanks which will be furnished by the Department.

EIGHTH: If at any time, in the opinion of the Commissioner of Health, said disposal plant herein approved fails to accomplish the proper purification of the sewage, or if the borough shall fail to deliver all of the sewage of the municipality to said plant, then such remedial measures shall be adopted as the Commissioner of Health may suggest or approve.

The attention of the borough authorities is hereby called to the importance of careful work in the construction of the plant, and of intelligent and faithful attention to its operation and maintenance thereafter.

Harrisburg, Pa., March 7th, 1907.

HARRISBURG, DAUPHIN COUNTY.

This application was made by the city of Harrisburg and is for permission to construct a sewer from Paxton creek up Mish's run to connect with the existing sewer at Seventeenth and Berryhill streets, and to discharge the sewage therefrom through the Paxton creek intercepting sewer into the Susquehanna river within the limits of the city.

It appears that the city of Harrisburg is located along the east bank of the Susquehanna river and through the town paralleling the river and distant a half mile or so therefrom, flows the Paxton creek from the north, emptying into the river near the southern limits of the city. Formerly the sewers of the city emptied either directly into the river or into Paxton creek. The latter received the drainage of the larger and more populated area, and in consequence the stream was badly polluted. To obviate this nuisance, the city built an intercepting sewer which is now in operation, whereby the ordinary dry weather flow of the sewage from the combined sewers of the town formerly emptying into the creek is intercepted and discharged into the river.

Into the lower end of this creek a natural water course empties known as Mish's run. It comes down from the east, rising in Swatara township about three-quarters of a mile east of the city line, draining all told, approximately seven hundred and twenty-three acres, about two-thirds of which are outside of the city limits. Both within and without the city the stream receives considerable sewage and is thereby rendered foul and objectionable. This also obtains with respect to the lower part of Paxton creek into which the flow of Mish's run is discharged. If this flow were diverted into the intercepter, the nuisance in Paxton creek would be prevented. This is one of the objects of the proposed Mish run sewer.

To the east of Paxton creek valley in Harrisburg there is a precipitous bluff at the top of which is the district known as the Hill. It is desirable for residences and is being rapidly developed. In this part of the district drained by Mish's run within the city territory, there has been built or projected five miles of streets of which nearly two miles have been already permanently surfaced by asphalt. In these streets and others, combined sewers have been built, and they form a part of a system which discharges through a fifty-four inch sewer into Mish's run near Fifteenth street. From here down to Cameron street, which is at the foot of the hillside and near Paxton creek, Mish's run is an open channel except where it passes under the Reading Railroad. Immediately north of the railroad Mish's run is joined by Hamilton run which drains three hundred acres, mostly in Swatara township, including the village of Eastmere, a growing suburb of Harrisburg. This stream is strongly polluted by sewage, so it and Mish's run below Fifteenth street down to Cameron street, are open sewers. From Cameron street to the creek the run passes through a masonry structure five feet in diameter. Above Fifteenth street Mish's run disappears from view, being confined under ground in conduits varying from sixty-six inches in diameter to two twenty-four inch pipes, until Eighteenth and Rudy streets is reached near the city line where the conduit is five feet in diameter and where the open channel again appears. The area tributary to this point is two hundred and seventy-six acres.

The abandonment of the open channel of Mish's run from Rudy street to Fifteenth street and the substitution therefor of underground conduits has been done partly by the city of Harrisburg and partly by private enterprise in anticipation of the rapid development of this section of the city.

By ordinance approved by the mayor June seventh, nineteen hundred and six, the Board of Public Works was authorized and directed to take charge of the construction of a sewer for general drainage purposes from Paxton creek up the valley of Mish's run to the end of the existing public sewer at the west side of Seventeenth street to connect with the sixty-six inch concrete sewer at this point. The ordinance provides that this main sewer or culvert shall be for drainage purposes. The creation of a loan of the city in the sum of four hundred thousand dollars of which one hundred thousand dollars may be expended for extensions and improvements of the sewerage system was authorized at a public election held for the purpose in nineteen hundred and five, and councils have appropriated out of the loan the sum of fifty-five thousand dollars for the payment of the costs and expenses of constructing the said Mish's run sewer and a connecting sewer in Eighteenth street, approval of which was given by the Commissioner of Health November twenty-third nineteen hundred and six, under certain conditions and stipulations, among which are the following:

"That no sewage shall be allowed to be discharged into said Eighteenth street sewer or drain unless it be temporarily, pending the construction of a conduit for the removal of sewage only in said street.

"That the discharge of sewage either directly or indirectly into Mish's run shall cease on the first day of December nineteen hundred and seven.

"On or before the last day of December nineteen hundred and six the city shall prepare and submit to the Commissioner of Health for consideration a plan for the discontinuance of the discharge of sewage into Mish's run from the Eighteenth street sewer and all tributaries thereof."

The terms of this permit were complied with. The plans now submitted for the Mish's run sewer districts are modifications of those submitted in nineteen hundred and six.

To remedy the existing evil in Mish's run and lower Paxton creek as quickly and completely as possible, it is proposed in the plans submitted and now under consideration to construct the sewer of sufficient size to accommodate both stream flow and sewage, provided at the banks of Paxton creek a large silt basin with two pipes leading therefrom under the bed of the creek to a junction with the Paxton creek intercepting sewer. One pipe will be twelve inches in diameter and the other eighteen inches, and they will have a capacity of thirteen cubic feet per second. Above this amount the volume coming down from the Mish's run sewer and discharged into the silt basin will overflow into Paxton creek. The ordinary summer flow of Mish's run, including, of course, Hamilton run, as frequently observed at a point a short distance above Cameron street, where for three years such ordinary summer flow of the stream has been diverted into a ten inch pipe to avoid a nuisance at the church and parsonage located nearby, has been about one and five-tenths cubic feet per second. The said twelve inch and eighteen inch pipes to intercept the sewage at the silt basin and convey it to the Paxton creek intercepter, therefore, will discharge about ten times the volume of the ordinary dry weather flow of the streams, including the sewage therein, before any overflow can take place into Paxton creek.

The city urges the point that such overflows taking place only during violent storms will be of short duration and will pass off with the flood flow in Paxton creek to the Susquehanna river.

The proposed Mish's run sewer from Paxton creek to the east side of Cameron street is to be a five foot circular invert supporting a new concrete top five feet wide and three and five-tenths feet high having a slope of sixty-six-hundredths per cent. From Cameron street to near the Reading Railroad embankment, the structure is to be seven feet wide, four feet high, reinforced concrete on a slope of one and five-tenths per cent., from here to the fifty-four inch sewer at Fifteenth street, the section is to be six feet wide by four and five-tenths feet high on a slope of about one and five-tenths per cent. The fifty-four inch sewer is to have its top reconstructed with a capacity equivalent to the drain above and below it. The new structure above is to be built of reinforced concrete, having a six by five feet rectangular section on a slope of eighty-five per cent., terminating and connecting with the city drain in Seventeenth street near Berryhill street at a point four thousand feet from the proposed silt basin on banks of Paxton creek.

The alignment of this sewer which is largely in private property has been agreed upon after extended negotiations between the city and the owners of abutting property. It is the only line possibly whereby the sewer can be built within the appropriation and for the purpose stipulated and for which the public voted the loan. After the sewer is built it is to be covered over with many feet of earth and subsequently nothing will appear in the landscape to indicate that a hollow and natural water course formerly existed in the vicinity. Investors of real estate and all other interests concerned have agreed that the proposed plan is the best one and only one to follow.

The petitioners represent that the built up section of the area within the city limits drained by Mish's run is now and has been for many years fully sewered on the combined system, and that it is not expedient or desirable or necessary to dig up the asphalt streets and parallel existing sewers by sewers on the separate system. However, in the unbuilt up part of the district within the city limits drained by Mish's run and by Hamilton run, and in the territory outside of the city drained by these runs, which territory is rapidly building up and already contributes considerable sewage pollution, although sewers have not been built therein, it is not expedient or desirable or necessary that sewer extensions should be on the combined plan, for the reason, if for no other, that sewers are immediately demanded there and the cost of constructing them on the separate system will be many times less than the cost of building the combined system. Storm water can be emptied into the natural water courses which will find proper outlets through the Mish's run drain to the creek and river, the sewage, however, should be conveyed to the Paxton creek intercepter.

Because the entire Mish's run basin will, in all probability, be annexed with other property in the vicinity to the city of Harrisburg at no very distant date and because it is not for the interests of the city of Harrisburg or of public health that a sewage disposal plant should be located anywhere in the territory of Hamilton run or Mish's run, therefore, the city should, in laying out a plan for the building of separate sewers in the unsewered portions of the district within the city, anticipate the annexation of the outlying tracts and plan therefor.

It has been unanimously agreed that the interests of the public health demand that a permit be granted and it is hereby and herein granted for the approval of plans for the proposed Mish's run sewer under the following conditions and stipulations:

FIRST: That the city shall on or before the first day of December nineteen hundred and seven, prepare a plan of separate sewerage for the undeveloped portion of the territory in Mish's run sewer district within the city limits and submit the same to the State Department of Health for approval, and thereafter said plans as modified, amended or approved, shall be followed whenever sewer extensions are made in such area of the city.

SECOND: The city shall take up and consider jointly with the State Department of Health the matter of providing an outlet by artificial channels for the present or prospective sewage in the drainage district of Mish's run outside of the city limits. Since the Mish's run sewer must receive and dispose of the flow of its tributaries and the city has been obliged to expend money to provide for such flow, it is not inconsistent with public policy, but expedient for the city to consider some other than a natural conduit for the drainage and sewer delivered from the outlying territories at the city line. This shall be done on or before the first day of December nineteen hundred and seven.

THIRD: The sewage from the portion of the territory in Mish's run sewer district within the city limits may continue to be discharged into the combined sewer system there until such time in the future, if ever, as it shall appear desirable or necessary to provide separate outlets or conduits for sewage only, and the sewage from the entire district shall be discharged as proposed into the Paxton creek intercepting sewer and through it into the river until such time as the Governor, Attorney General and Commissioner of Health shall fix and determine for the discontinuance of the discharge of any sewage from the city into the Susquehanna river. This question is being considered in connection with the application of the city dated August twenty-ninth nineteen hundred and six for permission to extend the general sewer system of Harrisburg.

FOURTH: No pathological material from any laboratory shall be discharged into the sewer. The proper authorities shall cause these wastes to be incinerated on the premises.

FIFTH: At the close of each season's work plans of sewer extensions in the Mish's run district shall be prepared and filed with the State Department of Health together with such other information in connection therewith as may be required.

SIXTH: If for any reason the sewerage system or any part thereof should become inadequate or a menace to public health, then such remedial measures shall be adopted as the Commissioner of Health may suggest, recommend or approve.

Harrisburg, Pa., May 2nd, 1907.

HARRISON TOWNSHIP, ALLEGHENY COUNTY.

This application was made by the township of Harrison, Allegheny county, Pennsylvania, and is for permission to construct a proposed sewer system.

It appears that Harrison is a township of the first class located on the west bank of the Allegheny river in the extreme northeastern corner of Allegheny county and has a population in the neighborhood of five thousand five hundred of which four thousand five hundred people live in the village of Natrona. This village was established by the Pennsylvania Salt Manufacturing Company when it located its large plant in the township.

The township stretches along the river for a distance of about four and a half miles and back therefrom a little over a mile. To the west is the township of Fawn and to the south the borough of Brackenridge.

Midway of the township there is a ridge elevated about two hundred and fifty feet above the river and extending southerly into Brackenridge borough and northerly into Butler county. Northerly of the village the slopes are precipitous to the river, so that no opportunity affords for extensive building operations; but at the site of Natrona there is a plateau about twenty-five feet above the river and from a third to a half mile wide, extending southerly, so that the area of future growth for the village is naturally confined to the territory between its present limits and Brackenridge borough.

The hillsides abound in copious springs which form the beginnings of runs which come down across the flats to the river and these waters afford sources of supply to the public and to the industrial plants for drinking purposes.

The West Penn branch of the Pennsylvania Railroad skirts the foot of the slope. The principal part of the village and the industrial plants are located between the railroad and the river.

There are five important industrial concerns in the township. Their employes either reside in Brackenridge borough or Natrona. There is about three-quarters of a mile distance between these two places. The land there is either occupied by the industrial plants or is under cultivation.

The Solid Steel Tube and Forge Company have works on the railroad near the Brackenridge line and the sewage therefrom is discharged into the Brackenridge sewer system. The water supply of this plant is obtained from a spring on the hill west of the railroad.

The plant of the Interstate Steel Company, and the works of the Allegheny Steel Company, located along the river, and said to be controlled by the same interests, employ about one thousand four hundred and fifty men. Both works are supplied with Allegheny river water for industrial purposes and with drilled well water for drinking purposes. A filter and sterilizing plant is now being provided for the purification of the drinking water.

The Reliance Tube Company, manufacturers of boiler tubes, and employing about one hundred men, has its plant immediately south of the village. The water supply is piped from a spring on the hill, west of the railroad, but when this proves insufficient, an old dug well on the premises is resorted to. Privies over earth vaults are also provided on the premises, which renders the dug well supply at least suspicious.

When the Pennsylvania Salt Manufacturing Company located its plant, it laid out streets, water works, drainage pipes and erected dwellings for its employes. The land developed by said company includes practically everything north of Pond street, which street runs east and west through the central part of Natrona. Here resides at least one thousand five hundred people, whose drinking water is obtained from springs on the hillside west of the railroad and supplied by gravity through pipes owned and operated by the said Salt Company. Paralleling this system the company has laid an independent line of fire service pipes in the streets of the village, north of Pond street. Water for industrial purposes and fire protection is obtained from the river. The company has filed a plan of the water pipes but has not submitted a report in relation thereto.

The village south of Pond street is supplied with drinking water by the Tarentum Water Company of Tarentum borough. The source is the Allegheny river and crude water drawn from an intake crib is delivered to the system and supplied to the boroughs of Tarentum and Brackenridge and a part of East Deer township besides the southern portion of the village of Natrona. The water is known to be polluted by sewage and it is often muddy when drawn from the spigot. In spite of the admonition by local physicians to the consumers to use only boiled water, typhoid fever and other diseases attributable to impure water annually reach significant numbers among the said water company's customers, or in the district thus supplied.

It is reported that individual wells in the village are unknown. Some of the citizens go to the springs on the hillside for the household supply.

Privies with earth vaults, or connected to sewers, are very common in Natrona. But few cesspools have been reported. Slop water and kitchen waste, especially on the hillside west of the railroad reaches highway, gutters, or the runs. East of the railroad the runs have been substituted by culvert or pipe drains and what sewage gets into them is delivered there through individual house connections. However, slop water disposal into street gutters is in vogue irrespective of districts. There is need for a general sewerage system.

Along the river, between its bank and the river road, there are numerous dwellings, mostly frame structures of the poorer class, from which domestic wastes are either directly thrown into the river or discharged therein through pipes.

There are six sewer outlets into the Allegheny river within the village and also two others below the village in the township. Beginning with the uppermost one, and naming them in order, they are as follows:

The Pennsylvania Salt Manufacturing Company, Stone culvert, Garfield street, Walnut street, Pine street, Sycamore street, Brackenridge sewer and Allegheny Steel Company.

The Pennsylvania Salt Manufacturing Company's drain is a stone structure about four feet square and receives both sewage and storm water from the upper part of said company's plant and real estate development. The products of this company's plant are sulphuric, muriatic and nitric acids, hydrate of alumina, copperas, sulphate of soda, and sal soda. The solid wastes from the processes are deposited on the premises. The liquid wastes are discharged through conduits into the river. It is reported that about one hundred and fifty thousand gallons daily of iron and soda solutions are discharged into the Allegheny river from the works and that these powerful precipitants materially assist in the clarification of the stream, as proven by bacteriological tests of the river water above and below the plant. The drain extends from near the Natrona station across the company's yards to the river. It has been substituted for a natural water course. Into it, near the river, there is said to be an eighteen inch sewer connected by means of which the northern part of the company's property is drained. The runs and surface drainage from the hills and the overflows from the springs there, west of the railroad, is

received into these drains. It is reported that there are in the neighborhood of one hundred dwellings west of the railroad whose kitchen wastes and wash water is discharged onto the surface of the ground and either through runs or street gutters finally reaches said drains or a stone drain serving the same purpose further south in the village. In warm weather the odors and the appearance along the streets forcibly testify to the desirability of some other method of waste disposal. One or two private sewers are reported as existing west of the railroad, having connection with a four foot company sewer.

The stone culvert extends from the railroad south of the passenger station to the river south of Pond street and between it and Chestnut street. Formerly there was a natural water course here. It was walled up and enclosed in the said stone culvert by the abutting property owners. The lower portion of it from near Center alley to the river was constructed by the Salt Company, is reported to be about four feet square and into it the said company has led the Pond street sewer extending up Philadelphia street across the railroad and in Vine street north and south, west of the railroad, south of the station. Many, if not all the buildings along these sewers are connected with them. Occasionally the privies on the property are allowed to remain and are connected with the pipe line to the street sewer. While this arrangement is not ideal, it serves to effect a removal of sewage to the river and undoubtedly is least troublesome to the tenant or house owner. The buildings on Chestnut and Pond streets backing towards the stone culvert universally discharge kitchen waste through individual pipes therein and in some instances the privies in yard are connected to the pipe. There is a private sewer in Center alley connecting with the stone culvert which receives the sewage from two hotels and a residence. All told, the stone culvert is known to receive the sewage of nine hundred and twenty people. The Salt Company's sewer serves at least one hundred and fifty employes.

The Garfield street sewer is said to be eighteen inches in diameter, serves about two hundred and twenty people including a school and is controlled by Rev. P. A. Brady.

The Walnut street sewer comprises two lines of storm drain, built and owned by the township and connected into a twelve inch private sewer leading from River Avenue Hotel to the river.

The Pine street sewer is reported to belong to the township, to be twelve inches in diameter and to receive storm water only.

The Sycamore street sewer is a private drain, connecting a residence on River road to the river.

In the township below Natrona village there is but one industrial sewer discharging into the river. It is the Allegheny Steel Company's plant. It is thirty inches in diameter and is used to carry off surface drainage from both the Interstate Steel and the Allegheny Steel Companies works. It also receives sewage from privies on the former company's property and from some of the privies on the latter property. There is a cesspool for office closets and for the sewage from that part of the Allegheny plant not connected with the thirty inch sewer.

Immediately south of Sycamore street, which street is the southerly boundary of the village is the private estate of H. M. Brackenridge, from which a private sewer, said to be six inches in diameter, extends to the river.

So it is a safe assumption that one third of the village population permanently and over one-half that number during the working hours of the day, contribute to the pollution of the Allegheny river.

The petitioners represent that the proposed plans for a municipal sewer system were adopted in nineteen hundred and three and it appears from the general plan submitted that the sewers are to range in sizes from ten inches to five feet in diameter, that they are to receive both sewage and storm water and are designed to drain the hillsides and the flats in the built up part of the village from Sycamore avenue northerly and also to intercept the flow from all existing public and private sewers and culverts in the village north of said Sycamore street, excepting the Salt Company's four foot sewer and the lower portion of the stone culvert. The point of discharge into the Allegheny river of the proposed system is opposite the foot of Sycamore street, the outlet being a four by five foot structure carried to low water.

If the reports are accurate, the assessed valuation of property in the township is two hundred and nineteen thousand eight hundred and twenty dollars only. It is also reported that there is a bonded indebtedness and that the Commissioners have a fund of about five thousand dollars in the treasury. Hence, under these conditions, the borrowing capacity is in the neighborhood of fifteen thousand dollars. Thus limited by the constitution, the utmost prudence in the expenditure of the public funds is called for to assure the distribtion of the benefits of a public sanitary improvement to the greatest number. A general combined sewer system cannot be built for the money now available, but a small pipe system for the reception of sewage only might possibly be built under some equitable plans of sewer assessment, such as is provided by law.

The proximity of municipalities on the Allegheny river below Natrona, coupled with the fact that at eight different places within seventeen miles, water is drawn from the river and used as a source of public supply, renders the problem of sewage disposal at Natrona one of wide-spread concern relative to public health.

Some of the places below Natrona supplied with Allegheny river water are as follows:

Tarentum, distance one and five-tenths miles; New Kensington, three and five-tenths miles; Parnassus, four and five-tenths miles; Oakmont, eleven miles; Perona, thirteen miles; Montrose (Allegheny city intake), thirteen and five-tenths miles; Pennsylvania Water Company, fifteen miles, and Pittsburg, seventeen miles.

Strikingly significant are the facts with respect to the prevalence of typhoid fever in the Tarentum Water Company's district. In the borough of Tarentum, which is much larger than the village of Natrona, during nineteen hundred and six there were one hundred and ten cases of typhoid fever reported and for the first five months in nineteen hundred and seven, forty-six cases. In the borough of Brackenridge, from which reports are very incomplete, the disease is known to have been common. This has not excited local attention probably because typhoid is present the year round.

During the last part of nineteen hundred and five, typhoid was epidemic in Natrona village, and of thirty cases attended by one physician twenty-six were on the Tarentum supply and four originated out of town. The same physician attended ten cases during nineteen hundred and six, all in the village and on the Tarentum supply, with one exception. It is said that not a single case of this water borne disease has been traced to or charged against the spring water supplied to the northern half of the village by the Salt Company's system.

The sewers now existing in the village deliver their pollutions into the river immediately above the point from which the water is drawn out of the river and returned to the consumers in the south part of the village to be used for domestic purposes. Hence the township authorities are concerned with respect to the removal of this menace to the township's water supply. Notwithstanding this fact, the proposed plans do not provide for the treatment or purification of the sewage. It is evident that so long as typhoid poison be discharged into the river from Natrona, the health of the general public in the towns down stream using the river waters for drinking purposes will continue to be menaced. The notably high typhoid rates in the Allegheny river valley testify to the consequences of polluting drinking water with sewage. In order that Natrona shall cease to be one of the foci of infection, two things are necessary; first, typhoid should be banished from the village, and second, sewage discharged into the river must be discontinued.

The banishment will be caused largely by a pure water supply. If the river is to be continued as a source the water must be thoroughly purified by modern and approved apparatus. Meantime all river water used for domestic purposes should be boiled.

The discontinuance of the discharge of sewage into the river can be effected by the erection of sewage purification works, by means of which the chances of pathogenic poison being introduced into the waters of the State may be largely minimized, if not wholly obviated. However, it is not practicable, owing to excessive cost, for a township of Harrison's size to construct works for the treatment of both sewage and storm water. The economies of the case very generally throughout the Commonwealth, where sewage must be treated, require that the conduits in which surface waters are removed shall be separate from the pipes designed for the conveyance of household drainage to the disposal works. Because the proposed sewers are now designed to take sewage and storm water, they are not adapted to the present or future requirements imposed by the State under the law requiring the preservation of the purity of streams for the protection of the public health.

Furthermore, no provision is made in the plans for the interception of the sewers at the industrial plants in the township. It would not be consistent to require the village sewage to be treated and permit the sewage from an equally great population resident at the mills and factories during working hours to go into the river. Either the private corporations must take care of their own sewage, or the public corporation must make provision therefor under some equitable adjustment of costs and expenses.

It appears that the growth of the township and the village will be in the valley on the plateau, and it is reasonable to anticipate the ultimate occupation of all the land there. The selection of a site for sewage purification works, is a most important matter and calls for study, foresight and the laying down at this time of the sanitary policy which shall prevail for the future. The time has arrived for the adoption of a comprehensive sewerage plan and

the township commissioners need the services of a competent and experienced engineer to devise comprehensive sewerage and sewage disposal plans. These should be submitted to the Commissioner of Health for approval.

It has been determined that the interests of the public health demand that a permit be withheld and permission is hereby and herein withheld to the township of Harrison to construct the proposed sewer system and the township is advised that it will be necessary for the commissioners of said township to prepare new plans for the collection of all the sewage of the village of Natrona and for its conveyance to some point for treatment and purification. The plans for sewerage and sewage disposal should be comprehensive and be designed in anticipation of future as well as present needs. Storm water should be excluded from the sewers, separate conduits being provided for drainage. Upon preparation of the new designs, which should be by some experienced engineer, such designs should be submitted to the State Department of Health for consideration.

It has also been determined that the township commissioners should be requested and they are herein and hereby requested to notify the public in said township to boil all river water used for domestic purposes.

The various private companies in Harrison township from whose plants sewage is now discharged into the Allegheny river, will be notified, that some other method of disposal than of the river must be provided, preferably by connection to the township sewerage system and sewage disposal works when such are available.

Harrisburg, Pa., July 22, 1907.

INDIANA, INDIANA COUNTY.

This application was made by the borough of Indiana and is for permission to extend the borough's sewers and for permission to discharge the sewage therefrom into the waters of the State.

It appears that the borough of Indiana, county seat of Indiana, is a substantial community of about seven thousand people, located in the central part of the county in the water shed of the Black Lick creek, a tributary joining Conemaugh river two miles below Blairsville and forming a part of the Allegheny river basin system.

For years the country round about has been occupied by farmers, an average percentage of the ground being under cultivation, but recently extensive coal operations have been started all around Indiana, and the vast coal deposits hitherto untouched are now being mined, steam railroads are being built through the country and a great industrial development has begun. Villages are springing up along the Black Lick and its branch, Two Lick creek, which may, in the near future, outstrip Indiana borough's growth, but, undoubtedly, the latter must feel the impetus and hence increase in population at a greater rate than in the past.

Through the municipal territory there are two parallel valleys running north and south in the westerly one of which flows the stream known as Paper Mill run, or White Spring run, and in the easterly one of which flows Marsh run. These two streams join below the borough whence the course which is known as Stony run continues southerly through White and Centre townships, a distance of about three miles to Two Lick creek. A mile and a half below, Two Lick creek is joined by Yellow creek, and about five miles farther down, Two Lick creek joins Black Lick creek. All three streams come from the east. Two Lick creek forms the source of supply to Indiana borough and upon its water shed large mining operations are being conducted. The pollution has made necessary the installation of a water filter plant. The improvements under erection by the Clymer Water Company of Indiana comprises, besides the filtration plant, the erection of a new pumping machinery, a force main, distributing reservoir and larger supply main in the borough.

Out of the total population of seven thousand, one-half take the public water and the other half use private wells and springs which are scattered throughout the town. It is estimated that there are six hundred shallow wells in the borough. The geological structure is a porous shale formation and on account of surface pollution of the soil, the ground waters in the borough are suspicious sources of a drinking supply. While there are both public and private sewers in the town, privies abound and some cesspools.

The built up portion is on the ridge between the valleys of Marsh run and White Spring run. The industries which are few, are located in the valleys and their wastes are discharged into the streams and pollute them. Such pollution has been the subject of complaint to the State Department of Health by owners of property affected.

It appears that White Spring run rises in a spring called White Spring just north of the borough line. The water is piped to and used in the Indiana Brewery. So the flow of the stream is naturally small during dry times and it is alleged that the flow therein is largely polluting liquid from the brewery,

the Indiana Provision Company's plant and the Indiana Woolen Mill. Evidences of gross contamination may be seen beginning immediately below the brewery increasing below the cold storage plant and reaching the maximum immediately below the woolen mill. Here wool in the fleece is received and made into blankets. In the process of scouring, rinsing and dyeing, liquid wastes of a highly polluting character are produced which are discharged into the run.

The polluting matters from the brewery and the provision company's plant are largely domestic sewage. The slaughter house is reported to have been abandoned early during the current year.

Near the borough line on White Spring run the Pennsylvania Railroad Company has a pump house and standpipe by means of which the run water unpurified is furnished for locomotive uses. It is known that railroad employes sometimes drink water taken at will from locomotive tender tanks without thought as to the source of supply and this careless habit is believed to be one reason for the prevalence of typhoid fever among railroad hands.

On Marsh run which rises above town and drains a farming country, there appears to be no specific pollution except that of yard drainage and sink drainage in the borough until the works of the Indiana Collar Company and Tannery Company are reached just south of Philadelphia street. The reddish color of the water in the run below indicates the source of pollution to be of tannery origin. From this point down to Stony Run the stream is an open sewer.

In nineteen hundred and three the borough adopted a system of separate sewers and began the construction thereof. Since then lateral extensions have been made slowly. The system comprises a main intercepting sewer in Marsh run valley and White Spring run valley and an outfall sewer eighteen inches in diameter beginning at the forks of the two valleys and extending down Stony run valley a distance of one mile where it is discharged into Stony run on a nine acre tract of land purchased by the borough in anticipation of the erection thereon of sewage disposal works.

The outfall sewer is laid in excavation its entire length and is brought into the nine acre tract in one corner thereof at an elevation of about thirty feet above the bed of the run in order that there may be sufficient vertical height for the erection of proper sewage purification works. In this respect the municipal authorities have exercised commendable foresight.

Both valleys in the town are flat and are subject to flood. The west or White Spring run intercepter is twelve inches in diameter and extends northerly as far as Water street. Connected with it there are eleven thousand and fifty feet of lateral sewers of which four hundred feet are six inches in diameter, four thousand feet eight inches in diameter and six thousand six hundred and fifty are ten inches in diameter. The main sewer itself is seven thousand seven hundred feet long; so that there is a total of eighteen thousand seven hundred and fifty feet in the system or three and a half miles.

The sewers are all reported to be public. The State Normal School having approximately six hundred students and one hundred and fifty employes, formerly discharged its sewage into the run near the head of Stony run, but recently this sewer was connected up and now empties into the White Spring run intercepter. It is ten inches in diameter and three thousand feet long.

The east or Marsh run intercepter is also twelve inches in diameter and extends northerly a distance of eight thousand two hundred feet to Philadelphia street. Connecting with it there are thirteen thousand five hundred feet of lateral sewers of which seven hundred and fifty feet are six inches in diameter, five thousand seven hundred and fifty feet are eight inches in diameter and seven thousand feet are ten inches in diameter. So there is a total of twenty-one thousand seven hundred feet in the system, or four and one-tenth miles or for the entire borough seven and six-tenths miles of sewers, all of which are public.

Besides the three thousand feet of private sewer for the Normal School there are other private sewers in the borough. They empty into the runs. There is an old eighteen inch drain emptying into White Spring run south of Oak street which formerly served Hotel Moore and other buildings. In nineteen hundred and six, the borough authorities notified all properties to disconnect with this sewer. However, there are evidences at its outlet that sewage or kitchen waste is still being discharged through the sewer into the run. Its total length is fifteen hundred feet. In Water street there is a six inch pipe sewer about four hundred and fifty feet long, receiving laundry waste and drainage from several houses, so it is reported, which empties into White Spring run.

The first drain laid in the borough was constructed by the county years ago to serve the jail, court house and vicinity. Its outlet is a twelve inch pipe and it empties into Marsh run south of Locust street. This system has been extended in several streets and alleys to serve private streets and residences, so that in the system to-day there is a total of eighty-six hundred feet. The sewers take roof water and cellar drainage, so it is reported, as well as sewage proper. The run is very pronounced in pollution below this outlet. It appears

that the sewer is inadequate during storms. It is possible for said outlet to be connected with the Marsh run intercepter but since this sewer main, as well as the White Spring run intercepter, overflows in times of flood and backfloods cellars, the borough authorities question the expediency of such a connection.

The borough has permitted cellars to be drained into the sewer system and roof water connections have also been made. There is also reported to be a large amount of seepage into the sewers, whether through house connections more than through street sewers, is not known. Manhole covers are perforated and through the holes surface waters are known to enter in considerable quantities. Furthermore, cellar drainage contributes very materially towards surcharging the intercepters. The backflooding of properties connected with the sewer system and located south of Philadelphia street in the valley has become a serious trouble, and the borough wishes to be advised as to the remedy. It is the wish of the local authorities that permission be granted to extend the sewer system as originally designed in different parts of the borough.

Below Indiana borough, the lands bordering Stony run are used principally for pasturage, and the pollutions are such that the waters of the stream are not suitable for cattle to drink. The simple and effectual remedy is the enforcement of a regulation compelling all properties in the borough to connect with the public sewer. Preliminary treatment should be required at the woolen mill and possibly at the tannery before the liquids would be suitable to admit to the sewer system. If these connections were effected, Stony run would be reclaimed from pollution as well as the streams in the borough down to the point where the borough outfall sewer discharges, and, therefore, all ordinary pollutions would be abated.

The nine acres owned by the borough were purchased of Mr. J. M. Hileman. In the distance of two miles between this point and Two Licks creek, the land bordering the run is owned by Mr. Hileman, Mr. Wm. Evans, Mr. Householder, and J. M. Guthrie. These men have employed counsel and petitioned the State Department of Health to remedy the pollution of the stream. Citizens of Indiana borough who purchase milk from one or more of the above named farmers, Mr. Hileman alone furnishing upwards of eighty gallons of milk daily to the town, have threatened to discontinue the purchase of milk from cattle pastured in the lands abutting the stream. The farmers desire that the borough should extend the outfall sewer to Two Licks creek and it is said that the right of way for the sewer will be given for this extension. If this were done, and the discharge of private sewage into the runs in Indiana borough were not discontinued, the remedy would be insufficient, since Stony run water would continue to be polluted, and hence, unwholesome for watering cattle. Surveys have not been made to determine the cost of extending the sewer to Two Licks creek.

The latter creek will become rapidly acid in quality above Stony run, and possibly the run itself will become acid in the future when the coal which underlies Indiana borough is mined.

On Two Licks creek, four miles below Indiana borough there is a village of Two Lick and six miles below the borough at the forks of Two Licks creek and Yellow creek is Homer City borough, population one thousand people. Eight and one-half miles below is the village of Graceton, population twelve hundred and rapidly growing where the Youngstown Steel Company conduct operations which include mining, crushing and washing of coal and coke ovens. Just below this village is that of Coral, population one thousand, where the Joseph Wharton coke works are located. Their places along Two Licks creek turn into the stream pollutions from industry which render the water inky black and acid. So that Black Lick creek, which is a relatively clear stream, is very preceptibly discolored below the mouth of Two Licks creek. Just above this juntion on Black Lick creek, is the village of Josephine, population two thousand, and also the village of Black Lick, population eight hundred, which are thriving by reason of the blast furnace of Corrigan and McKinney. This company mines and cokes its own coal and hence adds to the sulphur pollution of the stream. In time coal operations on the Upper Black Lick will undoubtedly render the waters more acid than they are at the present time.

Black Lick joins the Conemaugh river twenty miles below Indiana borough and fourteen miles below this point or thirty-four miles below Indiana borough the borough of Saltsburg takes its water supply from said river, without any attempt at purification of said water.

The State's policy is to preserve the purity of the streams for the protection of the public health. The petitioners have not shown the necessity, so far as public health is concerned, for the discharge of Indiana borough sewage into Two Licks creek whence it is possible for it to be transported in a few hours by water carriage and be introduced into the water works system of Saltsburg in a condition capable of poisoning the water consumers of that municipality.

It is reported that the valuation of the borough of Indiana is one million eight hundred and fifty thousand dollars, and that its total indebtedness is seventy-five thousand six hundred dollars which includes a forty thousand

dollar bond issue of July second nineteen hundred and six for street improvements of which fifteen thousand dollars are still unsold. Therefore, the borough's borrowing capacity is in the neighborhood of fifty-four thousand dollars which is more than ample to construct disposal works on the nine acre tract of ground. The topography of this area is favorable to the layout of an economical plant. The development of the art precludes the obtaining of a sterile effluent, but the liquid discharged from a well designed and operated plant should be non-putrescible and largely free from poisonous matters inimical to man or beast. When a municipality shall have minimized the danger in sewage by treating it in this manner, it may be considered that its full duty has been accomplished. Human beings would not attempt to drink the water in a small stream fed by the effluent from such a plant, and it does not appear necessary, so long as water can be obtained elsewhere, that farmers should water their stock in such a stream. In a territory developing rapidly changes are bound to occur which render unwholesome waters which were formerly pure and clear, and there is no practicable way to absolutely prevent some pollution. The best that can be hoped for is a minimization and control of the major sources of dangerous pollution.

Owing to the numerous private wells and springs in Indiana borough, and the proximity of privies, it would appear that the interests of the public health call for a more thorough use of the sewers than now obtains there. Also, that the owners of private sewers should be ordered to discontainue all discharges into the waters of the State, and that if the borough authorities cannot bring this about, then it should be accomplished by the State Department of Health.

While these remedies will abate the local nuisances and yet not sensibly increase the pollution of Stony run, the extension of the borough's sewers without adequate treatment of the sewage would increase the stream pollution and be contrary to good public policy.

It has been determined that the interest of the public health demand that permission be withheld for the present and it is hereby and herein withheld for the extension of the borough's sewers until the borough shall have first prepared a plan for the treatment of the town sewage, and have submitted such plans with a report, to the State Department of Health for approval. It is hereby requested that such plans and report be submitted on or before October first nineteen hundred and seven.

It would be well for the borough authorities to note that in the study of the problem, the flow of the main intercepters and the outfall sewer should be measured day and night during different kinds of weather to determine what proportion of the flow of sewage it may be possible to eliminate from the system in order to reduce to a safe minimum the total output necessary to be treated at the disposal works and how much roof and cellar drainage and surface water there is that may be more economically taken care of by some other means to be provided, possibly, by the borough. The attention of the local authorities is called to the fact that the Department of Health will be pleased to advise with them and to co-operate in the solution of the problem.

These studies should make apparent the remedy for the surcharging fo the sewer.

It has also been determined that the borough be requested and it is hereby requested that the proper local authorities shall submit a complete plan of the existing sewers showing their sizes, grades and elevations and the same for the proposed extensions of the system, and that this plan be submitted for approval on or before October first, nineteen hundred and seven. It should be accompanied by a report thoroughly setting forth under what conditions the borough will admit private sewers to the system. This report and plan is requested at an early a date as convenient in order that the interest of all concerned may be protected in bringing about a discontinuance of the discharge of private sewers into the streams in Indiana borough.

Harrisburg, Pa., June 10th, 1907.

INDIANA, INDIANA COUNTY.

This application was made by the borough of Indiana, and is for permission to extend its sewer system and to discharge therefrom through existing sewers into the waters of the State.

It appears that at a regular meeting of the Board of Health of the borough of Indiana, held on August sixth, nineteen hundred and seven, a resolution was passed, of which the following is a copy:

"Whereas the borough council has asked a special permit from the State Board of Health for the laying of a sewer on West alley from Church street south to South street and there connected to present sewer, we the said Board of Health, join in said request and urge the laying of said sewer as the sanitary conditions absolutely demand it.

"GEORGE W. WHEELER,
"President."

"J. H. Hill,
"Secretary."

It also appears that the following is a copy of the application made by the borough engineer, duly authorized by council, for permission to lay an eight inch sanitary sewer and connections in the borough, and to discharge the sewage therefrom into existing sewers there:

"Indiana, Pa., Aug. 8th, 1907.

"Hon. Samuel G. Dixon,
"Commissioner of Health,
"Harrisburg, Pa.

"Dear Sir:—At a regular meeting of council on August 5th, 1907, I was instructed to present to you an application for a special permit to lay an eight foot sanitary sewer on West alley from South street to Church street and a six foot sanitary sewer on School street from West alley to a point seventy-five feet west of the west line of Seventh street according to the enclosed plan. The grade of the sewer on West alley is to be 2.5 per cent., with a manhole at School street and a flush tank at Church street. The grade of the sewer on School street is four per cent. with a flush tank at the upper end. In presenting an application at this time council is prompted solely by a desire to relieve a situation that has become a menace to public health. Two houses on School street now use the same privy located within ten feet of one of them. There is a privy within oue foot of the Gibson House now building on the corner of School street and West alley. The presence of ground waters prevents the property on the southeast corner of West alley and School street from having any privy at all. Enclosed please find a recommendation from the local board of health.

"Yours very truly,
"R. M. MULLEN,
"Borough Engineer."

On June tenth, nineteen hundred and seven, the Commissioner of Health, in compliance with a unanimous agreement reached by the Governor, Attorney General and the Commissioner of Health, issued a decree withholding for the present a permit for the extension of the borough sewers until the borough shall have first prepared a plan for the treatment of the town's sewage and have submitted such plans with a report to the State Department of Health for approval, and requesting that such plans and report be submitted on or before October first, nineteen hundred and seven.

The borough engineer has, on behalf of the municipality, been in consultation with the Department and received advice relative to the preparation of said plans and said engineer is now engaged in designing the proposed works for the treatment and purification of the borough's sewers and the intention is to submit the designs for approval on or before said October first, nineteen hundred and seven.

The petty lateral extension which the petitioners now ask for special permission to construct is demanded in the interests of public health it would appear.

It has been determined that the interests of the public health demand that a permit be granted and it is hereby and herein granted to the borough of Indiana to lay the proposed sanitary sewer in West alley and in School street on the conditions and stipulations that the borough shall in good faith comply with the terms of the decree relative to sewage issued to said borough on June ninth nineteen hundred and seven.

Harrisburg, Pa., September 3rd, 1907.

JEANNETTE, WESTMORELAND COUNTY.

This application was made by the borough of Jeannette, Westmoreland county, and is for permission to extend its sewerage system and to discharge sewage untreated therefrom into Bull run within the limits of the borough.

The borough of Jeannette is a manufacturing community of about ten thousand population located on Brush creek in Westmoreland county and also on the main line of the Pennsylvania Railroad about twenty-seven miles east of Pittsburg. Incorporated in eighteen hundred and eighty-nine with a population of about three thousand, at no time has its prospects been brighter than at present.

Brush Creek is the boundary between Penn township on the north and Hempfield township on the south, and said creek also passes westerly through a portion of the southern part of the borough so that the part of Jeannette north of Brush creek is surrounded by Hempfield township.

The Pennsylvania Railroad tracks extend northwesterly through the town and the municipal territory north of it is hilly and largely occupied by residents. It is diveded into an eastern and western district by Bull run, a small stream rising in the hills to the north about two miles distant and coming down through a deep ravine, traversing the borough in a southerly direction,

passing underneath the railroad embankment and across the flats to Brush creek which it enters in the southwestern corner of the borough near Cassatt avenue.

The land along the creek is liable to inundation during freshets and this is especially true of the flats west of the McKee-Jeannette Glass Works. South of the creek the ground ascends abruptly and this portion is not built up to appreciable extent. East of Bull run and on either side of it, north of the railroad, the slopes are not too steep for occupation and the hills attain elevations of between one and two hundred feet above the creek.

There is a natural water course in the western central part of the town, beginning north of the railroad near Eighth street and taking a southwesterly course under the railroad and across the tracks to Brush creek at the end of Twelfth street. There is another small run in the extreme western part of the borough taking a similar direction and joining the creek at Fourteenth street. These several natural channels for surface drainage receive at the present time considerable amounts of sewage.

The principal industry is the glass works of the McKee-Jeannette Company, employing from twelve hundred to fifteen hundred hands, and occupying a large tract of land on the flats. The Jeannette Glass Company, employing about twenty-five hands, and the Union Planing Mill, employing about sixty hands, are located on the banks of the creek above Bull run. Just beyond the borough limits on the east, near the creek, is the plant of the Pennsylvania Rubber Company, employing possibly five hundred hands and just outside the borough to the north near Bull Run is the plant of the Pittsburg Lamp and Brass Company employing about one hundred and fifty hands.

The inhabitants are furnished with a public supply derived from mountain streams, the works being owned by the Westmoreland Water Company. The watershed is reported to be uninhabited and to be regularly patroled. The consumption which is metered is about three hundred thousand gallons daily.

There are a number of private wells in use in the town, especially on the flats, where also privies and cesspools are in general use.

The Pennsylvania Rubber Company uses water for boiler purposes obtained from a well bored two hundred and fifty feet deep. Because the water contains a trace of salt, the employes are furnished drinking water obtained from the Westmoreland Water Company and mechanically filtered on the premises.

The Pittsburg Brewing Company use deep well water for inferior purposes and the public supply otherwise.

The Pittsburg Lamp and Brass Company obtain water for drinking from a drilled well on the premises, and for boiler and other purposes, Bull run water is used.

According to reports on file in the Department, there were fifteen cases of typhoid fever during nineteen hundred and six. None having been reported during the current year. The origin of these cases is not known. There does not appear to be any connection between them and the methods of disposal of household wastes in vogue in the borough.

There is a municipal sewerage system on the combined plan first installed about eighteen hundred and eighty-nine. There are numerous outlets along Brush creek and the runs which flow through the borough. The run at Fourteenth street has been arched over between the railroad and the creek and so has Bull run. They have been practically converted into sewers. Including these arched portions the sewers aggregate about five and one-half miles in length. The map filed by the borough gives no information as to sizes and grades, and the Department does not have satisfactory information on this point or as to the records apparently being defective in regard to these matters. The municipal authorities report that where the sewer system is sanitary only the range in sizes of sewers is from eight inches to twelve inches in diameter, and that where the system is combined the range is from twelve inches to thirty inches in diameter, and that where streams have been arched over, the sewers are of brick and have diameters of five or six feet. The sewers are flushed by attachment to a water plug, and there is reported to be no ventilation. About four-fifths of the population is said to be in the present sewer district and using the sewers.

The industrial plants above mentioned all discharge sewage into the nearest stream. Just beyond where Bull run reaches the borough line it has been dammed by the Lamp and Brass Company and water is taken there for manufacturing uses. A short distance below the dam the company's sewer discharges into the stream. At the borough line the sewer for which application is pending also discharges into the run. A few hundred feet below this public sewer outlet, the stream has been dammed and boys were bathing in the pool thus formed at the time of the Department's inspection. Farther down the run receives sewage from the steam laundry, and at Gaskill avenue, from two borough sewers (one an outlet for the hill district to the east, and the other for the district to the west), and between said avenue and the railroad, it receives the flow from the brewery sewer. Immediately below the railroad the run is arched over to the creek, the conduit being six feet in diameter, and this portion receives the flow of at least seven public sewers.

The Twelfth street run, so called receives the discharge of three public sewers on Gaskill avenue north of the railroad, between Eighth and Ninth streets. It is reported to receive some sewage and also glue waste, from the McKee-Jeannette Glass Works. This run is an insignificant stream, during dry weather, and is badly choked with weeds, and on one point of the grounds of said glass works the water spreads out into a shallow place which should be ditched. Complaint has been made to the Department respecting odors existing in the neighborhood of this run.

The Fourteenth street run from the railroad to the creek has been enclosed in a five foot brick structure, and at its outlet there is a pool, stagnant and filthy in appearance. This may be said with respect to conditions at most of the sewer outlets into the creek. Brush creek within the borough limits consists of alternate pools and rapids. The pools are semi-stagnant at ordinary and low stages and show marked signs of pollution.

The two glass works and the planing mill have private sewers to the creek. In the vicinity and above the mouth of Bull run there are four public sewers with outlets to the creek also.

The proposed sewer for which applicatiin is pending was already constructed when an inspection was made by a representative of the Department in the latter part of April. The sewer is eighteen inches in diameter from Bull run easterly in the alley north of Frothingham street for a distance of about eight hundred feet and fifteen inches in diameter for the remaining length of about seven hundred feet. This is to serve as an outlet for lateral sewers in the adjacent district tributary thereto and permission is asked to make such extensions whenever they may be necessary.

It appears that on August eighth, nineteen hundred and six, a complaint was registered with the Department by a citizen of Jeannette representing that an open sewer receiving drainage from about thirty closets and discharging into Bull run existed in the northeastern section of the borough, to the prejudice of the health of the citizens of the neighborhood in particular and the public in general, and asking that an investigation be made and the nuisance abated. Whereupon, the matter was called to the attention of the local authorities, and, nothing having been accomplished by November twenty-eighth, nineteen hundred and six, a communication was again addressed to the local authorities, which elicited the information that the borough council had ordered pipe for the enclosing of the open sewer and that work would proceed as soon as weather conditions permitted. An application blank was then forwarded by the Department and on February fourth, nineteen hundred and seven, returned to the Commissioner of Health, duly signed. Believing that this action met the full requirements of the law in the presence of a written notice to abate the nuisance, the borough subsequently constructed the sewer.

During August of the current year, when a Department representative was on the ground, sewer pipe had been distributed along the surface of one or more highways in other parts of the borough where public sewers were about to be laid, but for which no application had been filed in the Department. Evidently, the authorities do not understand the law or its administration respecting State approval of sewerage extensions, since there appears to have been an attempt to comply with the law.

Fourteen miles below Jeannette Brush creek empties into Turtle creek. From this point the main stream continues easterly for about six miles to the Monongahela river. About three and five-tenths miles below, the borough of Homestead takes water from the river for public uses in emergencies, and further down stream the Ohio river is used as a source of drinking water for the towns along its banks in Pennsylvania. It is possible for the sewage from Jeannette to reach these points of intake in a few hours, and thus contribute to the menace of the lives of the people relying upon such sources for the source of public water supply.

Above Jeannette, Brush creek is free from mine drainage and fish are living in its waters. About three miles below the borough the stream receives the drainage from the Pennsylvania Gas Mine Number five, and from this ppint on increasing amounts of mine drainage are discharged therein, which destroy the creek's usefulness for general purposes, though some of the manufacturing plants on the main stream below Brush creek use the water for condensing, cooling, etc. The water exerts a strong corrosive effect upon the iron and steel with which it comes in contact, but it has proven cheaper to repair the damage done in this way than to purchase the large quantities of water which are required for said manufacturing purposes.

It is known that the acids also act as a germicide to a greater or less extent and hence this minimizes the results of the discharge of sewage in Brush creek and the main stream. However, there is a limit to this effect, and since Turtle creek and its tributary, Brush creek, traverses a district which is rapidly growing and into which the sewage of Trafford City borough and the boroughs of Pitcairn, Wall, Wilmerding, Turtle Creek and East McKeesport now discharge their sewage, (Jeannette and Irwin immediately below it sewering into

Brush creek) all told an aggregate population of upwards of forty thousand, and the total volume of sewage thus discharged is likely to reach and exceed the diluting capacity of the natural water courses in the near future, it is clearly apparent, in order that a public nuisance shall be obviated, that plans should now be conceived and adopted whose execution from time to time in keeping with the growth of the district will safeguard the interests of the public health.

The State cannot sanction the construction of sewers whose usefulness will be largely reduced in the near future. The circumstances demand that the State policy of use of natural water courses in the Turtle creek valley shall be uniform and equitable. It would be manifestly inconsistent to require one municipality therein to treat its sewage and permit others to dispose of it in the creek. It is to prevent a great nuisance therein and also safeguard the general public health and to preserve the purity of the water supplies below that the health precaution of taking the sewage out of the streams is an important one.

Jeannette sewers receive both sewage and storm water, although some of them are practically sanitary sewers, but to what extent is not known by the Department. It would not be economical or even possible on account of the cost for the borough to attempt to purify the mingled sewage and storm water, and hence, a separation thereof must be effected before disposal works can be erected. The assessed valuation of the borough is reported to be three million four hundred thousand dollars and the bonded debt about one hundred and forty thousand dollars, which, if true, gives a municipal borrowing capacity of about one hundred thousand dollars. There are available sites for a purification plant below the town, but how much it would cost to separate storm water and sewage and to collect the latter and treat it cannot be determined before adequate plans have been prepared thereof.

There are about eight miles of public streets paved with brick and it is reported that more pavements are contemplated and that combined sewers will be laid therein. It is probable, however, that the borough at this time is financially able to defray the cost of construction of plans for the collection of all of the sewage of the borough and its conveyance to one point to be chosen because of its adaptation to the purification of the sewage, and also to construct such works. However, the time for the treatment of the sewage may reasonably be postponed to the date when the municipalities farther down stream are required to treat their sewage.

It has been determined that the interests of the public health demand that approval be given and it is hereby and herein given and permission granted to construct the so-called Frothingham alley sewer petitioned for, and a permit is hereby and herein withheld for any further sewer extensions, under the following conditions and stipulations:

FIRST: That the borough shall on or before January first, nineteen hundred and eight, submit plans and profiles of the sewers as they existed on April twenty-second, nineteen hundred and five, and of the sewers which have been constructed since April twenty-second, nineteen hundred and five, the latter being specially designated on said plans and profiles. The same to show sizes and grades of the sewers, the location of all manholes, street inlets, the extent of the territory each sewer is designed to serve, together with the number of connections with the sewer system and the number of buildings on the line of the sewers.

SECOND: That on or before June first, nineteen hundred and eight, the borough shall prepare plan or plans for a comprehensive system of sewerage for the collection of sewage only from the entire borough, and its conveyance to one common point and for the treatment of the sewage there, and submit the same to the Commissioner of Health for approval. And when the same are modified, amended or approved, the Commissioner of Health may fix a time within which such plans shall be constructed and the works put in operation, having in view the date when the municipalities in the lower part of the Turtle Creek district may be required to do likewise.

THIRD: This permit to discharge sewage into the waters of the State shall cease on the first day of June, nineteen hundred and eight, but if the other terms of this said permit shall have been complied with, then the Commissioner of Health may, in the interests of the public health, extend the time in which such sewage shall be so discharged.

The borough authorities are requested to pay special attention to the various matters set forth in the foregoing discussion relative to the sanitary conditions in the borough and to provide remedies therefor as soon as such a course may be practicable. The State Department will notify the manufacturing companies that some other method of disposal of sewage than into the waters of the State will be required and suggest that connection with the borough system proposed may be found to be the most satisfactory method. Especially should the proper officials prevent bathing in Bull Run below the Pittsburg Lamp and Brass Company's sewer outlet in Penn township and the public sewer outlet in Frothingham alley at the township and borough line.

If the borough so desires it, the Department will be glad to extend its assistance and advice relative to the sewerage and sewage disposal plans called for. When these are adopted, lateral sewer extensions may be made at will without further application to the State and every dollar expended will be in accordance with a permanent plan assuring the greatest efficiency and also economy since no part of the work will require to be abandoned or reconstructed.

Harrisburg, Pa., November 2, 1907.

JOHNSONBURG, ELK COUNTY.

This application was made by the borough of Johnsonburg, Elk county, Pennsylvania, and is for permission to extend its sewer system and to discharge the sewage therefrom into the Clarion River.

It appears that the borough of Johnsonburg, Elk county, is a municipality of about forty-two hundred people, located in the valley of the Clarion River at the fork of the eastern and western branches thereof, about seven miles above Ridgway, the county seat.

It is purely a manufacturing community, is supplied with public water works and sewerage, and good railroad facilities. In one thousand nine hundred the population was three thousand eight hundred and ninety-five, in one thousand eight hundred and ninety, it was one thousand two hundred and eighty.

The main line of the Pennsylvania Railroad from Philadelphia to Erie, a branch of this line leading to Lardiee, and the Rochester and Pittsburg branch of the Erie Railroad, pass through Johnsonburg. They follow the valley of the river along which are located the manufacturies which are principally pulp and paper, the tanning of hides and chemical works. The New York and Pennsylvania Paper Company is the dominant concern. In the operations of tanning, pulp manufacture and the extracting of wood alcohol and various by-products, vast quantities of wood have been required and extended areas of woodland have in consequence been denuded, so that the territory about Johnsonburg contains a small amount of virgin timber. The New York and Pennsylvania Paper Company is reported to have acquired thousands of acres of land for the purpose of reforesting them. It is probable that the above mentioned industries are permanently located in Johnsonburg, and that the borough's population will gradually increase.

The Clarion River passes southerly through about the centre of the borough territory, the forks being located in the northern part thereof. The valley of the river and its branches is about one-quarter of a mile wide, and the land is at an elevation above the streams of about eight to twelve feet and is subjected to inundation. From these flats the ground rises rapidly on either side to the table lands above which are elevated about three hundred feet higher than the river.

On the flats are located quite a number of cheap wooden dwellings and on the steep hillsides most of the buildings in the town are to be found. The built up part lies principally to the east of the Clarion River and its eastern branch.

Silver Creek comes from the west and enters the west branch just above the north line of the borough.

Johnson Run comes from the west and empties into the main river about opposite the centre of the village just above Grant street bridge.

Powers Run comes from the east and joins the main river about at the borough line.

That portion of the borough in the northwestern corner just south of Silver Creek is known as Rolfe, it is sparsely built upon. That portion of the borough west of the river just south of Johnsonburg is known as Clarion Heights; it too is sparsely built up.

The paper and pulp mills occupy the lands bordering the west bank of the river near the forks. The tannery is located on the land between the two branches.

Above the town on both branches there are several chemical works and tanneries, all of which discharge their wastes into the streams. The New York and Pennsylvania Company uses large quantities of river water at its Johnsonburg plant in the manufacture of paper and because of the industrial pollutions from up stream, has been to the expense of installing and is now operating a mechanical filter plant in which it purifies about ten million gallons of river water daily, or as much as may be required for manufacturing purposes. This supply is not furnished to the town except possibly in case of a conflagration of considerable extent. In turn the wastes from this plant are turned into the Clarion River.

At present there are four sewer outlets in the borough. Two of them are into the river from the main part of the town. Another is in the Rolfe district, and the fourth in Clifton Heights district, and the last two empty into runs.

These sewers are designed to take sewage and roof and cellar water, but the latter may be excluded if the sewer should become insufficient in capacity.

The Rolfe district sewer is twenty inches in diameter and extends from Rolfe Lane down First street to Fern alley where it empties into a small water course, which leads to a swale in the vicinity of Julia street and thence a distance of about fifteen hundred feet to the west branch of the river. During dry weather there is no natural flowage from this stream, the sewage forms pools along the course and stagnates in the swale, and is a menace to public health. If the channel were to be cleaned out, thoroughly disinfected and put in shape to permit the sewage to flow to the river in the shortest time after leaving the sewer, an improvement would be effected in the general healthfulness of this locality, but such an expedient, if carried out, should be understood as being temporary only in its purpose.

The Clarion Heights sewer is ten inches in diameter and extends from a row of houses located just south of Johnson Run, easterly a distance of about eight hundred feet to said Run at the Erie Railroad culvert, a short distance from where said run empties into the river. If sewage is to be temporarily permitted to be emptied from this pipe into a stream, it should be below water in the river.

The Department has no evidence at hand as to whether the two last named sewers are public or private sewers. Neither does it appear why the proper local authorities have not determined that these sewers are a nuisance and acted accordingly.

The information at hand in the Department with respect to the main sewers of the town is meagre. Judging from the available information, the twenty-four inch outlet into the river at or near the foot of First street serves about one mile of street sewers of which nearly a half are eight inches in diameter. This sewer discharges into the river just below the dam in the river and water works intake of the New York and Pennsylvania Company's plant.

The only other sewer outlet from the town is a stone box structure thirty inches wide and forty inches high extending from Centre street under the Erie Railroad tracks and across the land and under the buildings of the New York and Pennsylvania Company to the east branch of the river just above the confluence of the west branch. This culvert was constructed and is owned and operated by said company. Into this culvert is discharged the refuse and waste from the paper mills which amount to a very considerable and constant quantity in consequence of which whenever there is more than an ordinary flow of sewage from the borough sewers which empty into the stone culvert (comprising about two miles of pipe sewer ranging in sizes from fifteen inches to eight inches in diameter) such flow overcharges the capacity of the stone culvert and sets back the sewage into the basements of the business blocks and residences along Centre street south of Cobb street, and also along the western side of Centre street.

If sewers are actually built where indicated on the map, then the most thickly built up part of the borough is well provided with conduits for the removal of sewage and the street grades being steep admits of the removal of considerable quantities of roof water.

However, many dwellings on the line of the sewers are not connected therewith owing principally to the expense incident to the connection with the sewer and the installation of modern plumbing facilities inside the buildings. In consequence, privies in the back yards over loose earth vaults are quite common. Many of them are full to overflowing, and storm water washing down the steep hill-sides carries with it not an inconsiderable amount of over-flowing privy material to be deposited on lower lying land or in the streets. Street surfaces are unpaved in Johnsonburg and the rains from the hill-sides have gullied out deep channels in the street gutters into which are openly poured in many instances, slops and wash water, and in some cases even sewage. Taken altogether, the borough is not a cleanly one, and parts of it are in a deplorable, insanitary condition.

The citizens of the borough obtain their drinking water partly from individual wells or from a neighborhood spring, and partly from the Johnsonburg Water Company. It is estimated that about twenty-seven hundred people are supplied by the Water Company, and that about fifteen hundred people are supplied by drilled wells and springs.

Owing to the topography of the borough the town is divided into high and low districts. The low district is small in area and is supplied by gravity from Silver Creek upon which there is a storage reservoir at an elevation insufficient to afford fire pressure. It is reported that whenever needed in the low district, pressure is obtained by use of pumps located at the works of the New York and Pennsylvania Company.

There are two high pressure districts in the town; the upper one comprises a few dwellings on the highest streets in the borough. The water is obtained from springs located on the table lands. These springs are properly fenced and housed in, and appear to be protected and free from any pollution.

The other high pressure district comprises the principal part of town. The water is obtained from Powers Run, both from the run itself and from springs

in the valley, is pumped into a reservoir located on the hill above the town, and from thence the supply is delivered by gravity. Besides being supplied to the inhabitants, it is also used by the railroads for locomotive purposes.

The individual wells are scattered about the borough.

A spring known as "Murray Spring" located in Clarion Heights on the side of the Erie Railroad location near the mouth of Jonhson Run is quite freely used by the people living in that vicinity and by the workmen in an adjacent machine shop. There are houses located on the high ground above the spring, and the surface drainage from the yards, privies and stables drain toward and possibly into this spring. It is reported that many of the people using the water from this spring have been sick with Typhoid fever. A Mr. Murray who resides on property immediately above the spring reports that there were two cases of typhoid in his own family just prior to the outbreak of typhoid among the workmen using the spring water.

In the fall of the year one thousand nine hundred and four, it is reported that over fifty cases of typhoid fever occurred in Johnsonburg. The exact figures are not known as the local health board reports are uncertain in exactness. More than one local physician has expressed the opinion that the number was at least seventy-five. Prior to the year one thousand nine hundred and four, the disease is said to be endemic. In the fal lof one thousand nine hundred and five, or about the first of August, a canvass showed that twenty-nine cases had developed within six weeks, also that an epidemic of dysentery, the exact extent of which could not be learned, but which was admitted to be large, had existed in the town for the same period.

The location of the cases showed that while the poor and foreign element living on the flats were most affected, the better class did not entirely escape. Practically all of the cases occurred in the district said to be supplied with water from Powers Run, or in the homes of those of the men who are employed in shops supplied by Powers Run, or the high pressure district.

The low pressure of Silver Creek district of distribution, so far as the Department is able to judge from the meagre data at hand has been quite free from typhoid. This district comprises about one-fourth of the town. It further appears from an investigation of the drainage area of Silver Creek, above the dam and reservoir, that the water shed is practically uninhabited and pollutions are not probable.

An investigation of the drainage area of Powers Run in the summer of one thousand nine hundred and five showed the first source of pollution to be about one mile above the water works pumping station. Here a settlement of ten houses existed whose privies, pig-pens and barn-yards are so located that the natural drainage in some cases aided by springs which crop out near privies and pig-pens, is direct to Powers Run. About two miles above the pumping station a virgin timber belt begun and extended for several miles along the run and its tributaries. This belt was then the scene of lumber operation and several camps containing from twenty-five to fifty men, mostly foreigners, and in some cases women and children. The total number of men so engaged was variously estimated from four to eight hundred. It was also stated that sufficient timber existed there to provide employment for some of the men for four or five years.

In camps occupied exclusively by men no privies were provided and where such structures were found, they were located directly on the banks of the run.

In one camp containing twenty-two men, it was ascertained that all had been affected with what was described as "bowel complaint," and that this sickness had lasted about a week, the cases occurring about four weeks previous to the outbreak of dysentery in Johnsonburg. The Department officers believe this was very probably the focus of infection.

The matter of surface pollution of individual wells has not yet been investigated by the Department, but the facts above mentioned call for the abandonment of the "Murray Spring."

The possible transmission over the surface of the ground of typhoid infection is illustrated in the case of a certain "Cooper" family where five cases simultaneously developed. This family resided on the hillsides. On the land above their residences outside privies were maintained, although a sewer was available. During a cloud burst the contents of these privies were flooded upon the property and into the cellar of the Cooper house. Members of the family actively engaged in removing the accumulation from the cellar. Typhoid had existed some months before in the house when the privy vaults were flooded and the contents washed into the Cooper cellar. Between ten and twelve days following the flooding five members of the Cooper family were affected with typhoid.

Because the stone culvert under the Erie Railroad and across the land of the New York and Pennsylvania Company which serves both as a private sewer and an outlet for a part of the sewers of the borough is too small to effectually accomplish the work now put upon it, the borough purposes to lay a new outlet sewer thirty inches in diameter, beginning at the said Erie culvert and passing southerly by or over the westerly line of the Erie Railroad location, a

distance of five hundred and sixty-two feet to an angle, thence westerly across the Pennsylvania Railroad tracks and by the St. Charles hotel a distance of two hundred and thirty-two feet to Broad street, thence southerly in Broad street and across private property, Grant street, and private property, a total distance from the point of beginning of two thousand one hundred and fifty feet to the Clarion river, said point of discharge into said river being about one-half mile farther down stream than the outlet of the said stone culvert.

It does not appear that the surcharging of the existing sewer outlet occurs during ordinary periods of sewage flow, and the borough officials may not have considered the practicability of obviating the surcharging by excluding all roof and storm water from the sewer.

The situation in Johnsonburg from the standpoint of the interests of the public health, not only of the citizens of the borough but the public in general who may be affected through the various mediums of disease transmission from a focus of infection such as does now and will continue to exist in Johnsonburg until proper sanitary measures are intelligently and vigilantly enforced, calls for prolonged consideration, prudent conclusions and action.

Typhoid fever and other water borne diseases are far above the normal rate. During the first eleven months of one thousand nine hundred and six, there have been twenty-eight cases of typhoid fever reported. Diminution in this rate cannot be expected but a very great increase is possible so long as sewage is improperly disposed of in the borough and the surface and ground water supplied used for drinking purposes are poisoned by pathogenic material.

The first efforts of the borough authorities should have for their object the protection of the lives of the people and practical measures must necessarily call for the expenditure of moneys. Last year the assessed valuation of the borough is reported to have been four hundred and thirty-three thousand three hundred and eighty dollars, which fixes the statutory limitation of bonded indebtedness at thirty thousand, three hundred and sixty-six dollars. If, as reported, there are on hand five thousand and thirty-six dollars with which to pay off the old bonds, then it would appear that the borough could issue further bonds to the amount of fifteen thousand, eight hundred and seventy-two dollars. It is understood that there is cash on hand to the amount of about forty-five hundred dollars, so that for general municipal purposes it is possible for a fund of about twenty thousand dollars to be raised.

Therefore, any serious mistake in the expenditure of funds might very materially handicap the borough in carrying forward a complete plan for the betterment of general sanitation in Johnsonburg.

The proposed sewer will stop the back flooding of a few properties only. The plan submitted does not show the size or grade of the proposed sewer, nor does it appear to have been designed with any clear conception of the work it should perform now and in the future. It is possible when sewage disposal works are built as they must be, that the proposed outlet sewer would not be at all adapted to the requirements of the town then. Furthermore, while there are known to be in existence plans and profiles of the existing sewers and of additions that must be made in the future to the system, yet the borough has never submitted such plans or a correct report of its sewer system, giving the Department reliable information called for in this connection. In fact, the borough's sanitary affairs have been certainly neglected or conducted in a dilatory manner.

The borough ordinance places the matter of all nuisances in the hands of the local board of health. Privy vaults, cess-pools, etc., unless water tight, shall not be dug or permitted to remain within one hundred and fifty feet of any well or spring used for drinking or culinary purposes, and yet it is obvious that this regulation has not been enforced. Further, in no case shall privy vaults be less than five feet deep. Earth privies and closets with no vault, pit or depression must be daily supplied with ashes or absorbents and contents completely removed monthly, and all vaults, cess-pools, etc., shall be cleaned out at least once in the fall not earlier than May fifteenth and at least once in the fall not earlier than October fifteenth. Besides, such structures shall be disinfected weekly by a solution to be approved by the local board of health. Still further, no offensive or deleterious waste or refuse shall be allowed to accumulate on premises or to be thrown or allowed to run into any public waters, streets, etc.

In spite of these regulations and the power of the local authorities and the prevalence of disease in the borough, it seems that systematic emptying of privy vaults has been neglected. Generally work of this kind having been performed only once in the past twelve years.

There is a provision whereby all buildings on the line of a sewer shall be connected with the sewer within thirty days from notification by the borough council, subject to fine and cost of said connection being made by the superintendent of sewers.

This provision has never been enforced generally. Where sewers are not provided or used, tight masonry vaults should be constructed under new borough ordinance prescribing dimensions and manner of construction to the end

that the overflowing of them or surface wash of the contents of these receptacles shall be absolutely prevented. The borough ordinance provides for a superintendent of sewers, but the appointment by the burgess has never been made so far as the Department is informed. This officer should be appointed.

The Murray spring should be abandoned and so should all others of a suspicious locality. The local board of health might well seek the advice and co-operation of the State Health Department with respect to the quality of all ground water used for drinking purposes in the borough.

Whether the sewer extension asked should be approved involves the question of expediency, the present use of the Clarion River and the futur treatment of sewage.

The Clarion River rises in the southern part of McKean county and flows southerly past Johnsonburg to Ridgway from whence its course is generally southwesterly passing through Elk, Jefferson and Clarion counties and joining the Allegheny River about one mile above Parker Landing borough. The drainage area above Johnsonburg is approximately one hundred and ninety square miles. The mouth of the river is eighty-two miles below Johnsonburg. It is reported that nowhere along its course is the river used as a source of municipal water supply. There are three boroughs in its length and their names and distances below Johnsonburg are as follows: Ridgway, Elk county, and Clarion and Callensburg, Clarion county, distant below Johnsonburg, seven, fifty-six and seventy miles respectively.

Twenty thousand dollars is an insufficient amount with which to undertake the construction of sewage purification works to handle the output of the present combined sewers of the borough. Should storm water be eliminated from the sewers, even then it is doubtful if the public sewer outlets could be intercepted and the sewage conveyed to and be disposed of in a modern purification plant for the sum of twenty thousand dollars.

Greater benefits would accrue to the public by the laying out and construction of an adequate sewerage system and the enforcement of house connections with such system which would probably use up at least twenty thousand dollars carrying with it of necessity temporary permission to discharge sewage into the river, than by any other measure.

At various points along the east and west branches above Johnsonburg the waste from tanneries and wood alcohol and chemical works are emptied into the river, and the waste from the tannery and paper and pulp mills within the borough are also discharged into the river. Solutions of caustic soda, lime, chloride and sulphurous acid go into the river from the mills in the borough and undoubtedly these act as deodorents and disinfectants to some extent. Under these circumstances and until the Department shall be in a position to collect chemical and bacteriological evidence of the extent of the pollution of the river by the sewage of Johnsonburg. or until some complaint against such pollution be formally made to the Commissioner of Health, it would seem, in view of the finances of Johnsonburg and the sanitary necessities within the borough, that the interests of the public health would best be served by the promotion of a comprehensive sewerage system there with a temporary discharge of the sewage into the river. Such a conclusion does not involve a measurable increase in the sewage pollution of the river to an extent which would endanger public health as much as the present menace within the borough requiring sewerage facilities menace such health.

It has been determined that the interests of the public health demand that permission to build the proposed sewer be withheld, and it is hereby and herein withheld, until the borough shall have prepared by a competent engineer a plan for an adequate sewerage system for Johnsonburg, which shall contemplate the exclusion of storm water, the collection of all of the sewage and its ultimate purification at sewage disposal works.

Furthermore, it has been determined that the borough immediately consider the expediency of excluding enough roof and storm water from the present sewers to obviate the immediate necessity of a new outlet sewer, and that it further consider the expediency of incorporating as many of the existing storm drains as may be feasible into the complete comprehensive sewerage system, plans for which are herein called for.

It has also been determined that the municipal authorities be required to submit a complete plan and profile at every existing sewer in the borough and that said authorities be notified that unless such plans are forthcoming, the State Department of Health will proceed to enforce the penalty for non-compliance with the law respecting this matter.

Harrisburg, Pa., April 13th, 1907.

JOHNSONBURG, ELK COUNTY.

This application was made by the borough of Johnsonburg, Elk county and is for permission to extend sewers in a part of its borough and to establish new sewers in another part of the borough and to discharge the sewage therefrom into the Clarion river within said borough.

It appears that Johnsonburg is a borough of about forty-two hundred population, located in Elk county on the Clarion River at the fork of the east and west branches thereof. It is an industrial community, there being pulp, paper and chemical works and tanneries. Large quantities of liquid wastes from these establishments are discharged into the river and pollute the same to the extent that many fish are gilled in the waters. Both above and below the borough similar industries add to the pollution of the river.

In Johnsonburg the industries are located along the stream and the residences on the side hills are steep. The town has public sewerage and private water works. Many springs and wells are in use in the borough. Pollutions of them have caused sickness, and there has been considerable typhoid, especially during the last two years.

There are four sewer outlets, two of them being into the river from the main part of the town, and the other on the opposite side of the stream, one from the district known as Clifton Heights. The sewers take sewage, roof water and in the flats some street water. The information at hand in the Department respecting the sewers is meagre. On September thirteenth, nineteen hundred and six, the borough made application to extend its sewer systems. On April thirteenth, nineteen hundred and seven, in conformity with a unanimous agreement by the Governor, Attorney General and Commissioner of Health denied permission to the borough to build the proposed sewer until the borough shall have prepared a plan for an adequate sewerage system, which shall contemplate the exclusion of storm water and the collection of all of the sewage and its ultimtae purification at sewage disposal works. Furthermore, the borough was requested to immediately consider the expediency of excluding enough roof and storm water from the present sewers to obviate the immediate necessity of a new outlet sewer. It was also unanimously agreed that the municipal authorities be required to submit a complete plan and profile of every existing sewer in the borough and the Commissioner of Health notified the authorities that unless such plans were forthcoming, the State Department of Health would proceed to enforce the penalty for non-compliance with the law respecting this matter.

It has been previously ascertained that for general municipal purposes, it is possible for a fund of about twenty thousand dollars to be raised. This is an insufficient sum with which to undertake the construction of sewage disposal works at Johnsonburg. The conditions of yards, street gutters and the town generally, from a sanitary standpoint, afford great need for improvement, and the interests of the public health would best be served by the promotion of a comprehensive sewerage system there, with a temporary discharge of sewage into the river. Such a conclusion does not involve a measurable increase in the sewage pollution of the river to an extent that would endanger public health as much as the present menaces within the borough, the abatement of which would be promoted by sewer extension. All of these matters were thoroughly reviewed and set forth in the Commissioner of Health's decree of April thirteenth, nineteen hundred and seven.

The petitioners represent that a number of cases of typhoid fever have developed during the past two or three months among the people living on the east side of First avenue from Cobb street northward, and that said outbreak is traceable to the filthy and unsanitary conditions along the alley on the east side of said dwellings and immediately in the rear thereof, therefore, permission is asked to lay a sewer extension in the alley lying between First and Second avenues from Cobb street northward to Bergen street and thence to the sewer in First avenue for the drainage of dwellings on Second avenue. The sewer is to be eight inches in diameter, to be known as the Spring alley sewer and have a total length of seven hundred and forty-one feet.

The petitioners also represent that ten dwelling houses have just been completed on the west side of Penn street between Bridge and Chestnut streets and that there is no means afforded at present for the disposal there of household drainage, and hence permission is asked to extend a sewer in Alley "A" lying between Penn and Market streets, from Bridge street southward to Chestnut street to connect with an existing sewer in said alley, the pipe to be eight inches in diameter and about one thousand feet long.

These proposed sewers are in the main part of the town and are to discharge into existing sewers there.

The petitioners further represent that there are no public sewers in that part of the borough of Johnsonburg lying west of the Clarion river, commonly known as "Clarion Heights," and because the citizens resident in said section are greatly inconvenienced by lack of proper sewerage, permission is requested to lay and construct a system of public sewers in said section of the borough on Plane avenue, First street, Harrison avenue and Clarion avenue to connect with a sewer main to be laid through the culvert and under the Buffalo, Rochester and Pittsburg Railroad, and across private property into the Clarion River. The sizes of the proposed sewers are to be six, eight, and ten inches in diameter. The largest being the outfall which will be three hundred and forty-two feet long and fourteen hundred feet of street sewer of which five hundred feet will be six inches in diameter.

No where along the course of the Clarion River which joins the Allegheny River about one mile above Parker Landing borough, eighty-two miles below Johnsonburg, is the water used as a municipal source of supply. The authorities of Johnsonburg have been extremely slow to comply with the requirements, to adopt the suggestions or to co-operate with the State Department of Health. Recently a new borough engineer has been secured, and it may be that the chief obstacle in the way of preparation of plans of the existing sewer system to be filed with the State Department of Health, according to law, is now removed.

In view of the urgency of the sewers proposed, and not overlooking the decree dated April thirteenth, nineteen hundred and seven, it has been determined that the interests of the public health will best be subserved by the granting of a permit and permission is hereby and herein granted for the proposed sewer extensions and the new sewers hereinbefore discussed, under the following conditions and stipulations:

FIRST: That all roof and storm water be excluded from the sewers, that manholes for inspection be placed at frequent sections and at changes in line and grade, so that there shall be absolutely a straight line of pipe between manholes.

SECOND: That permission to construct and use these sewers is given under the express stipulation that on or before the first day of November, nineteen hundred and seven, the plans of the existing sewer system and for the comprehensive sewer system mentioned in the decree of the Commissioner of Health of April thirteenth, nineteen hundred and seven issued to the borough of Johnsonburg, Elk county, with reference to sewer extensions, shall have been prepared and filed with the Commissioner of Health for approval. If at that time said plans are filed, then an extension of time for the use of the proposed sewers and the discharge of sewage therefrom into the waters of the State will be extended, otherwise such sewage discharge shall cease under the penalty fixed by law for the discharge of sewage into the waters of the State by a municipality contrary to the determination of the Governor, Attorney General and Commissioner of Health.

THIRD: No pathological material from any laboratory shall be discharged into the sewer system; the proper authorities shall cause these wastes to be incinerated on the premises.

FOURTH: If for any reason the sewer system or any part thereof becomes injurious to the public health, then such remedial measures shall be adopted as the Department of Health may suggest or approve.

Harrisburg, Pa., June 27th, 1907.

KANE, McKEAN COUNTY.

This application was made by the borough of Kane, McKean county, and is for permission to extend its sewer system and to establish new sewers and to discharge the sewage therefrom into the waters of the State outside of the borough in Wetmore township, said county.

It appears that Kane borough is a manufacturing community of about seventy-five hundred inhabitants, located in Wetmore township in the extreme southwestern corner of McKean county, on the summit of three water sheds whose drainage is into the Allegheny River. It is also on the main line of the Philadelphia and Erie Division of the Pennsylvania Railroad system and the terminus for three other railroads, one northerly to Mt. Jewett, with connections to the Erie Railroad and the Buffalo, Rochester and Pittsburg, which line is called the Bradford, Bordell and Kinzua Railroad; another one, known as the Kane and Elk Railroad, extending southerly into the lumber regions of Elk county with connection to Tionesta Valley Railroad; and the third, a narrow gauge line, belonging to the Baltimore and Ohio, extending southerly to Foxburg on the Allegheny River, from whence it is a broad gauged line to Pittsburg. So transportation facilities to the Great Lakes and the seaboard and to points north, south and west are good, and it is said that rates are not unfavorable to an expansion of the borough's industrial boom.

The surrounding country is rich in the production of oil and gas, and the soil is adapted to agriculture. The principal industries are engaged in the manufacture of glass. A superior quality of sand for this purpose is quarried in the vicinity. The Pennsylvania Railroad Company has repair shops here, the Standard Oil Company has oil well supply and repair shops, and there is a brush block factory, saw-tooth works and blind manufactory, besides several smaller industries.

The borough in eighteen hundred and ninety had a population of twenty-four hundred and forty-five, in nineteen hundred, of fifty-two hundred and ninety-six, and every indication points to a continuation of its growth and prosperity. A community of at least fifteen thousand population may be reasonably anticipated.

The town is located at the southwest end of a mountain ridge which terminates in the western section of the borough so that the surface of the ground slopes northerly, westerly and southerly and southeasterly quite steeply the northern portion of the borough draining to the Kinzua Creek which flows northeasterly for a distance of twenty miles to the Allegheny River at Kinzua village, twelve miles above Warren on said river, the western and southern portion draining to and forming the head waters of the Tionesta Creek which flows generally southwesterly a distance of about fifty miles to the Allegheny River at Tionesta borough forty miles below Warren, and the land in the southeastern part of the borough draining into and forming the head waters of the tributary of the west branch of the Clarion River which joins the east branch at Johnsonburg thirteen miles below.

The inhabitants are very largely supplied with water by the Spring Water Company whose source of supply is several springs located on the mountain side near the head waters of the east branch of Kinzua Creek, from a series of drilled wells in the valley of said creek and from small impounding reservoirs there, in which the ground, spring and surface waters are stored and from which the water is pumped to a standpipe one hundred feet high and sixteen feet in diameter, located on the highest ground within the borough. From this standpipe the water is distributed by gravity to the consumers, the average amount used daily being slightly in excess of one million gallons. It is reported that the public is generally satisfied with the quality of the water, but the supply is insufficient during extreme dry seasons, and that the water company must in the near future obtain an additional source.

In various portions of the unsewered districts of the borough, kitchen slops are conducted by drain pipes to the street gutters, and this disposition of the liquids creates a stench along the streets which has been the cause of complaint to the State Department of Health. There are reported to be sixty cesspools in the town. They are constructed with loose stone walls. There are also about three hundred privies erected over pits excavated in the natural soil to a depth of a few feet. Some of the cesspools and many of the privies overflow and contaminate the surface of the ground in the vicinity and cause nuisances which are a menace to public health.

,There are numerous dug and drilled wells about town from which water is taken for domestic use. There are also several springs in the unsewered districts supplying water for drinking. Some of these wells and springs are so located that kitchen drainage and seepage and overflow from privies may contaminate the waters.

The cesspool receiving the sewage from the Pennsylvania Railroad depot is located immediately above a spring which supplies water to several families.

In the western part of the borough, on Mr. Thurston's property, at the corner of Park and Ash streets, is a spring used for drinking water located on ground lower than several privies from which drainage is toward the spring. In the same district, on Mr. Hungerfords property, is a spring furnishing water to several families which is so located as to receive the surface drainage of a public highway. Also in the neighborhood on Mr. Thurston's property, is a dug well the water of which frequently has a bad smell and taste. Above the well there are several privies. Also on the Jacobson lot, corner of Tionesta avenue and Maple street, there is a spring so located as to receive surface drainage from the highway into whose gutters, it is reported, kitchen slops are emptied. Several privies are also located on higher ground in the vicinity.

In the northwestern part of the borough, on John Hanson's property, is a cesspool on a steep bank, the seepage and overflow of which is toward a dug well on property immediately below it and at the residence of Angelo Donacci on Reynolds street is a driven well around which slops from the kitchen and laundry are poured and form a pool, overflowing into Reynolds street in front of the house, in the gutter of which there is another pool. This particular instance has been the cause of a neighborhood complaint, and in fact the above examples are simply a few of many similar instances in the borough where the conditions invite sickness and epidemic.

It does not appear, so far as the Department is informed, that there has been any widespread disease in the town attributable to unsanitary conditions, and this fact tends to increase insanitary practices and to promote a disregard for the observance of hygienic regulations.

,The Pennsylvania Railroad passes northwesterly through the borough dividing it into a northeasterly and southwesterly district. The old part of the town is in the northeastern district. Here are the stores and many residences, some of the smaller manufactories, and along the Pennsylvania Railroad the glass works and railroad shops. The streets are very generally sewered, pipes ranging in sizes from six inches to twenty-four inches in diameter, receiving very little street water, but all roof water, and discharging into two parallel trunk sewers, one being twenty-four inches and the other twelve inches in diameter, laid in the valley of the west branch of the Kinzua Creek and discharging into the same as points one-half and two-thirds of a mile, respectively, below

the borough line, in Wetmore township. The shorter line is the twenty-four inch outlet. There is an overflow manhole located about one-third of a mile below the borough, into which the trunk sewers empty and out of which the ordinary flow is conducted by the twelve inch pipe to the creek. When this sewer is insufficient in capacity, the surplus is taken by the twenty-four inch pipe to the creek. The outlets are in a wooded territory unoccupied except by a saw-mill and a public highway about two hundred feet from the creek and paralleling it.

In this district system there are eight and a half miles of public sewers, of which five miles are twelve inches in diameter and one and a half miles eight inches in diameter. The resident population is estimated to be one-half the total for the town.

Below the sewer outlets for five or six miles the creek flows through a wooded territory, but the balance of the way to the Allegheny River it is through an open and thickly settled farming country. Cattle are pastured along the banks and drink from the waters of the stream.

The three other public sewer outlets into the waters of the State are in the district south and west of the railroad and the old part of the town. One of them is a ten inch sewer at the foot of Fraley street into the east branch of the Tionesta Creek in Wetmore township. Connected with this outlet there are street sewers all ten inches in diameter, approximating one-half mile in length. The outlet is into a small ravine secluded and wooded. The district sewered is wholly residential and lies immediately south of and contiguous to the old portion of the town. West of this district there is a section undeveloped heavily timbered and some of it is occupied by the public park. In the park there is a spring and pond, the overflow of which is into a twelve inch sewer serving at least two dwellings and discharging into the run below the park in the wooded track. The outlet is within the borough. The stream joins the creek in the township below the Fraley street outlet and above the Elk avenue outlet.

The Elk avenue sewer is eighteen inches in diameter and empties into the creek at the foot of said avenue in the township. This outlet is also in the woods away from dwellings. It serves all of the western district of the town now sewered in the borough. There are connected about six thousand feet of twelve inch pipe. The eighteen inch outlet is six hundred feet long.

The southwestern portion of McKean county and that portion of Warren county through which the Tionesta Creek and its branches flow, is a highly developed oil and gas territory, and the streams receive the sewage and waste from the several oil and gas operations and the wastes from tanneries located at Clarendon, Sheffield, Brookston and Kellettville. Fully one-half of the land contiguous to the creek is wooded and the balance is farm land under cultivation.

The White Rock Land Company, during the month of May, nineteen hundred and seven, constructed a sewer on its own land in and adjoining the borough of Kane in the western part and connected twenty-three houses to this sewer and discharged the same into the creek at the foot of White Rock avenue, about one-quarter of a mile below, where the borough's sewer at the foot of Elk avenue discharges into the same stream. Said company was not aware, so it represents, that it was necessary for a permit to be obtained from the State for the construction of a public sewerage system emptying into a natural water course. Application for such a permit has since been made and is now under consideration by the Commissioner of Health. This district is favorably located topographically for a large development and in the future will probably be annexed to the borough of Kane. The water company has pipes in a part of the addition at the present time.

In the same district below the White Rock avenue sewer, there is a sewer from the factory of the Case Brothers Cutlery Company into the same stream. This has been in use for two years.

The local authorities propose to make certain extensions to the Kinzua Creek district system. These extensions consist of about a mile of twelve inch pipe and nine hundred feet of eighteen inch pipe. The eighteen inch pipe is to parallel a line of eight inch and twelve inch pipe which is now insufficient in capacity at times to serve the contributing district. Five hundred of the twelve inch is to parallel a line of six inch sewer now insufficient in capacity.

In the Fraley street district, south of the railroad the borough has constructed during the current year a new twenty inch sewer outlet into Tionesta Creek at the foot of Fraley street at the point where the present ten inch outlet empties and connected with it eight hundred feet of twenty inch, seven hundred feet of fifteen inch and twenty-six hundred feet of twelve inch sewer, laid during the current year, or now in process of building. It is reported that no dwelling has been connected with the sewer. The borough asks approval of the same.

The petitioners propose to construct sewers in the new district in the western part of the borough. The plan calls for a twenty inch outlet into a tributary which passes down by and through land of the White Rock Land Company and which is desirable for real estate development, joining Tionesta Creek about

one-third of a mile below the said White Rock Avenue sewer outlet. There is a residence on the banks of this run and the owner thereof has notified the borough of his objection to the pollution of it as proposed.

The twenty inch outlet would be in Wetmore township and it is designed to serve about two miles of sewers, the smallest being twelve inches in diameter.

A sanitary survey by the Department disclosed the existence within the borough of one hundred and thirty-six nuisances resulting from the improper disposal of sewage and kitchen drainage and these are scattered at different points, both in the sewered and the unsewered portions of the town. There are many estates abutting sewers that have not been connected therewith. In the interests of public health the local authorities should either compel the connection of every estate with the abutting sewer or enforce measures to secure a sanitary method of disposal of domestic waters thereon. Cesspools should be abandoned and privy vaults if used should be made of masonry watertight and carried up above the surface of the ground to keep out all surface drainage, and the local Health Board should see to it that these receptacles are cleaned out before they become full.

The disposal of kitchen drainage into street gutters is a public menace, more especially during the presence of an epidemic. Health precautions demand that such drainage be conducted to the sewer. A plentiful supply of lime or some other disinfectant should be used along the street gutters until a permanent remedy be afforded.

The Board of Health should cause an abandonment of all wells and springs in the borough so located as to be liable to surface or underground pollution. Failure to take this precaution at Ridgway, Elk county, has undoubtedly contributed to the extent of typhoid fever there. At present there are over two hundred and sixty cases under treatment attributable to polluted water supply.

It appears that the borough of Kane has extended its sewers during the years nineteen hundred and five and nineteen hundred and six, and during the current year, in defiance of State law and under the advice, so it is reported, of some of its officers. This policy was most ill-advised and extravagant. The sewers which have been built are much larger than necessary to carry off sewage proper and much to small to remove sewage and roof and street water. The discharge of sewage into natural water courses in Pennsylvania has resulted in so much sickness and death that the interests of the public health have demanded the enactment of a law to obviate such pollution. It is the policy of the Commonwealth to ultimately remove from all streams all domestic sewage and to require the treatment thereof before the liquid be permitted to go into natural water courses. The cost of treating both sewage and storm water is prohibitive and both economy and efficiency dictate that separate pipes shall be provided in many cases for the removal of the sewage. The sewers now in Kane borough receive large quantities of roof water, and the treatment of this storm water would make necessary a much larger expenditure not only for the cost of erecting works big enough to receive and handle both sewage and storm water, but also thereafter for the operation of such unnecessarily large works.

The existing sewers have been largely built by piecemeal without due regard to the ultimate treatment of the flow or of the amount of flow which should be admitted to the pipe. At this time, it is essential that the borough should study the entire question and lay out a comprehensive sewerage system and sewage disposal works, not only for the present needs, but also adapted to the growing and future demands of the town.

Surface drainage facilities are naturally good. The slopes of the borough are adequate to afford speedy drainage and surface waters now reach natural water courses in short distances and by them are conducted to the main streams. Short lines of storm drains may be built from time to time to perfect this system so that the problem of how to handle storm water is easy of solution. It is not necessary in many cases to conduct roof water to the sewers. The roof pipes may be led to the street gutters and the water be thus disposed of at the least cost. This method prevails and is satisfactory in communities several times the size of Kane. If this were done, sewage only would remain to be conveyed in the sewer pipes to the disposal works, hence the size of the works would be proportionately reduced and the cost of purification kept down to the minimum.

It does not follow, because sewage is now discharged into the Kinzua and Tionesta Creeks, that this disposition is proper, or that the public health demands that the pollutions shall be increased. To the contrary, while it is evident that sewer extensions are needed in the borough, the petitioners fail to show why it is necessary that the health of people owning property along the streams and whose stock drink from the waters outside of the limits of the borough should be endangered by a continuation of the pollution of these waters. The borough's assessed valuation is reported to be one million, nine hundred and twenty-four thousand four hundred and twenty dollars and its bonded debt fifty thousand five hundred dollars. If these figures are correct,

the municipal borrowing capacity is in the neighborhood of eighty-four thousand dollars, a sum much greater than is necessary to defray the cost of treatment of the sewage before it is discharged into the waters of the creek.

Owing to the very unsanitary conditions in the unsewered districts and the immediate benefits that will accrue from the extensions of existing sewers, and because the railroad depot cesspool should be abandoned and the new hotel on Fraley street in the vicinity cannot be opened without an extension to the existing system, and in view of the other circumstances, it seems desirable that sewers should be built at once.

It has been determined that the interests of the public health demand that a permit be issued and it is hereby and herein issued for an extension of the existing sewer on Fraley street under the Pennsylvania Railroad to the new hotel being constructed, and for an eighteen inch relief sewer in Hacker street and for a twelve inch relief sewer in Dawson street; and it has been determined that a permit be withheld for the present and it is hereby and herein withheld for any further extension or for the construction or use of new sewers and outlets into any of the waters of the State under the following conditions and stipulations:

FIRST: That the borough shall forthwith employ a competent engineer, skilled in such matters, to consult with the borough engineer and local authorities and prepare a comprehensive sewerage system for the entire municipal territory whose object shall be to collect all the sewage and deliver it to one or more common points for purification. The study shall embrace the question of the utilization of as many of the existing sewers as may be found practicable in the comprehensive plan, and the elimination of roof water from the system as far as this may be found practicable. It will be prudent for the borough to take into account the sewerage of such territory as is liable to be annexed to the municipality in the near future. The topography is such that the sewage from the small part of the borough within the Clarion River water shed be conducted into the Kinzua Creek district, where, in Wetmore township, remotely located, may be found favorable sites for the erection of a sewage disposal plant to serve that district. And in the valley of Tionesta Creek, in Wetmore township below all property likely to be preempted in the future for the growth of the borough or its suburbs, there are favorable sites for a sewage purification plant for the treatment of the sewage tributary to this district.

As soon as such comprehensive plans and studies and a report thereof shall have been submitted to the Commissioner of Health for approval, said Commissioner shall give the subject due consideration, and if the interests of the public health demand it, will issue a permit for the construction of sewers in conformity with this comprehensive plan or modification of it.

SECOND: Such comprehensive plans, together with plans for sewage disposal works, shall be submitted to the Commissioner of Health on or before the first day of May, nineteen hundred and eight. Permission to discharge sewage into the waters of the State shall cease on that date, but if the terms of the permit shall have been complied with, the Commissioner of Health may extend the time for such discharge and fix the date when the sewage disposal works shall be built and put in operation and all sewage in the borough delivered to said works.

The local authorities are especially requested to heed the suggestions and advice herein given relative to cesspools, wells and springs. The owners of sewers now discharging into Tionesta Creek in Wetmore township will be notified that some other method of disposal must be adopted and put into execution at the time the borough discontinues the discharge of its sewage into said creek. Preferably, this should be done by a connection with the borough's intercepting sewer leading to the municipal sewage disposal plant herein contemplated.

Harrisburg, Pa., October 7th, 1907.

KANE, McKEAN COUNTY.

White Rock Land Company.

This application was made by the White Rock Land Company of Kane, McKean county, and is for permission to discharge sewage through existing sewers owned by said company, into a small stream, flowing through land belonging to said company and known as Tionesta Creek.

It appears that Kane borough is located in Wetmore township in the southwestern corner of McKean county at the head waters of the east branch of the Tionesta Creek which flows in a generally southwestern course for a distance of fifty miles to the Allegheny River which it enters at the borough of Tionesta, Forest county.

A mile and a half below Kane is the village of James City, a lumbering settlement of about five hundred people, nine miles below, the creek crosses the line into Warren county, and thirteen miles below Kane at the village of

Donaldson, it joins with the south branch, and with the west branch at Barnes village, fifteen miles below Kane. On the south branch in Forest county, are the villages of Sheffield, Junction and Brookston. On the west branch and its tributaries are the villages of Sheffield, Tiona and the borough of Clarendon, in Warren county and the villages of Ludlow and Wetmore in McKean county.

Four and one-half miles below Barnes, the main stream crosses the line from Warren into Forest county whence it passes through the villages of Foxburg, Balltown, Mayberg, Kellettville, Newton and Nebraska on its course to Tionesta and the river. These villages have a population of from two hundred to five hundred inhabitants each. Clarendon and Sheffield have about fifteen hundred population each.

The east branch passes through a wooded country. Its waters are polluted by the sewage of Kane.

The south branch also drains a wooded country. Its waters are polluted by a tannery at Brookston.

The west branch drains a more open agricultural region. Its waters are polluted by three tanneries at Sheffield and sewage, and by tannery and sewage waste at Clarendon, and by tannery waste at Ludlow, and the waste from a chemical manufactory at Wetmore.

On the main stream at Foxburg there is a large chemical works, at Kellettville there is a tannery, and on practically the entire water shed there are oil and gas operations. The lower stretches of the creek are bounded on both sides by land under cultivation and to some extent pasturage field, but while the pollutions, especially from the tanneries, is markedly evident in the stream, the topography of the creek valley which is usually narrow and deep, together with the scarcity of rural habitation there, accounts for the fact that complaints have not been registered by inhabitants of the district against the emptying of sewage and manufacturing waste into the creek.

About all of the runs which contribute to the main creeks are clear, pure mountain streams, suitable for any uses by man or beast. They are said to abound in fish, while in the main streams below the chemical works and tanneries there has been a marked decrease in aquatic life, so it is reported.

The borough of Kane is the largest community on the watershed. It has a population of seventy-five hundred, estimated, and is growing rapidly. About one-half of its area drains northerly and easterly into other streams. About fifty per cent. of the inhabitants reside on land contributing to the Tionesta and most of the manufactories, are here. All existing sewers empty into the creek and an application for permission to extend sewers and to build others in the borough is now under consideration by the Commissioner of Health.

It appears that the White Rock Land Company during the month of May nineteen hundred and seven, constructed a sewer with connections on its own land in Wetmore township, adjacent to the borough and made connections to twenty-three residences, the sewage of which is now emptied through the main sewer into Tionesta Creek. The Company represents that it was not aware of the fact that permission must first be obtained from the State Health Department for the construction of any public sewerage system whose flow is discharged into any natural water course. So at this late day application is made for approval of the sewers.

This company appears to be the owner of a large tract of land favorably located for real estate development. Part of it has been laid out into building lots and the future growth of the borough may be in this direction to a considerable extent. As has been the case within the borough, where sewers laid by private enterprise in highways have been taken over by the municipality and made a part of the public system, these sewers which the White Rock Land Company have already built and others which it must lay in further developing the property will sometime in the future, probably be taken over and become by ownership, as well as by use, public sewers. It has been determined to be the policy of the State in private operations of this character when extensively undertaken, to consider the proprietors as having a similar standing before the State Department of Health as have the local authorities of public corporations having in charge matters relating to sewers, and, therefore, to consider their applications and grant permits under prescribed stipulations and conditions.

It is by no means certain that manufacturing wastes will always be permitted to discharge into public waters. Besides, because a stream is partly polluted it does not follow that the contamination should be increased. Pure water courses are an asset to any land through which they flow, and unless it is necessary, no polluting matter whatsoever, more especially the poisons from the human body, should be permitted to defile the head waters of mountain streams. The customs in Kane borough must be changed in this respect before conditions get beyond control. It seems inevitable that the borough of Kane should erect sewage purification works in some secluded place in the valley of Tionesta Creek and convey the town sewage from the western and southern sections to this plant for disposal. To make this project economical

and efficient, storm water must be excluded and roof water to a large extent. The petitioners' sewers could be connected to this main outfall of the borough system as soon as it shall have been built. But such a connection would be acceptable, of at all, only on condition that roof and storm water be excluded and that some share of the cost of the disposal works and of the operation thereof were paid by the said land company.

There is a sewer discharging into the creek just below the said land company's sewer, which leads from the factory of the Case Brothers Cutlery Company.

Both these proprietors should plan for some other method of disposal than into the waters of the State. This dictates that the pipes should receive sewage only and that roof and storm water be excluded except possibly in moderate amounts for short periods during flushing.

It has been determined that approval be given to the sewerage project of the White Rock Land Company and it is hereby and herein given under the following conditions and stipulations:

FIRST: That said company shall forthwith prepare a plan of its land, showing the streets, lots and buildings now erected thereon and the sewers and water pipes, their sizes and grades, and also showing thereon proposed dvelopment of the land into streets and lots and proposed sewers and shall submit said plan to the Commissioner of Health together with some plan for other disposal of the sewage than into the waters of the State, which plans for sewerage and disposal shall be submitted on or before the first day of May one thousand nine hundred and eight.

SECOND: All roof and surface drainage shall be excluded from the sewers because this is essential to the proper disposal and purification of the sewage proper. Preferably, the White Rock Land Company should join with the borough of Kane in devising an outfall sewer and purification works to receive and dispose of both sewages.

THIRD: The borough of Kane will be given until May first, one thousand nine hundred and eight to submit comprehensive sewerage and sewage disposal plans. If on said date the White Rock Land Company has not complied with the requirements and submitted the plans called for, then, in that event, the sewage from its sewers shall be considered as having been illegally discharged into the waters of the State from the date of this decree and penalties therefor may be enforced; but if said company files the plans herein called for, then the Commissioner of Health may extend the time and fix the date when the sewage from the company's land shall cease to be discharged into any stream or body of water, but instead, shall be conveyed to sewage purification works.

Harrisburg, Pa., October 8th, 1907.

KANE, McKEAN COUNTY.

This application was made by the borough of Kane, McKean county, and is for permission to use existing sewers and to make necessary connections therewith and to discharge the sewage therefrom into the Tionesta Creek within the limits of Wetmore township, said county.

It appears that the local authorities of Kane constructed the said sewers in the new part of the town south of the railroad since April twenty-second, nineteenth hundred and five, without application to or permission from the State authorities as required by law. It is represented that this was done without knowledge of such law. The outlet is ten inches in diameter and empties into the east branch of Tionesta Creek at the foot of Fraley street in Wetmore township. Connected with this outlet there are street sewers all ten inches in diameter, approximately one-half mile in length, serving a wholly residential district lying immediately south of and contiguous to the old portion of the town. It is also represented that these sewers have not yet been used although it is a great hardship on abutting estates to deny permission to connect with the sewer. If this be not done, expensive cesspools will have to be constructed and the ground not being adapted to percolation, such cesspools will rapidly fill up and require emptying by means that will tend to foster a nuisance in the neighborhood.

On August fifteenth, nineteen hundred and seven, the borough made application for permission to extend its sewer system and to establish new sewers and to discharge the sewage therefrom at various points into the waters of the State outside of the municipal territory but in Wetmore township. On October seventh, nineteenth hundred and seven, the Commissioner of Health issued a permit for the extension of a sewer on Fraley street, for a relief sewer in Hacker street and for a relief sewer in Dawson street, but the Commissioner of Health withheld a permit for further extensions and for the use of sewers illegally built under certain conditions and stipulations which were substantially as follows: that the borough shall forthwith employ an engineer to prepare a comprehensive sewage system for the collection of domestic sewage but no storm water for the entire municipal territory and its conveyance to one or

more common points for purification, having in mind the utilization of as many of the existing sewers as may be found practicable, and to submit said plans to the Commissioner of Health for approval on or before the first day of May nineteen hundred and eight. On said date the discharge of borough sewage into the streams shall legally cease; but if the terms of the permit shall have been complied with, the Commissioner may extend the time for such discharge and fix the date when the sewage disposal works shall be built and put in operation and all sewage in the borough delivered to said works.

It appears that the local authorities propose to employ an engineer to prepare the said comprehensive plans, submit them for approval and request that permission be granted to build such extensions in the various parts of the borough where the conditions are extremely unsanitary at the present time, pending such reasonable time in the future as may be required to raise the money for and to erect the said purification works.

It has been determined that the interests of the public health demand that a permit be granted and it is hereby and herein granted for the use of the existing sewers under the following conditions and stipulations:

FIRST: That roof and storm water be excluded from said sewers, in so far as any new connections are made therewith.

SECOND: That otherwise the conditions and stipulations of the said permit of October seventh, nineteen hundred and seven, shall remain in full force and apply to this supplementary permit.

Harrisburg, Pa., November 9th, 1907.

LANCASTER, LANCASTER COUNTY.

This application was made by the city of Lancaster and is for permission to extend its sewer system in West Vine street and to discharge its sewage therefrom into an existing sewer.

It appears that in the city of Lancaster, near the central part thereof, on the corner of South Mulberry street and West Vine street, there is a public school building, three stories in height, with twelve rooms, accommodating six hundred pupils and known as the Mulberry Street School. This building has been in use for about sixteen years. During this time the Smead system of disposal of sewage by cremation has been in use. Principally through neglect by janitors, so it is represented, the burning of the deposits has created more or less of a nuisance in the vicinity, the infrequency of the cremation permitting deposits to accumulate which would in themselves prove obnoxious, so that finally the Hygiene Committee of the School Board has threatened to close the school unless some steps were taken immediately to abandon the Smead system.

The School Board has let a contract for the remodeling of the plumbing in the building and the installation of modern water-closets, and also a contract for the construction of a ten inch sewer in Vine street for a distance of about one hundred and seventy feet to the present terminus of a combined sewer in said street opposite Arch alley. A permit to the School Board to dig up this portion of Vine street was denied by the City Clerk for several reasons, one of which is reported to be that the proposed school sewer would not conform to the depth required of sewers laid in public streets necessary to accommodate all abutting property.

The city has modified and amended the proposed school house sewer and substituted therefor a plan for a sanitary sewer six inches in diameter, to begin where the present twenty-four inch combined sewer terminates in West Vine street at Arch alley and extending up said street a distance of two hundred and ninety feet to a summit. The grade will be nine per cent. Besides the school house, there are nineteen residences, six of which will connect immediately, so it is reported.

The sewer is to be laid about eight feet deep, will receive sewage only and ultimately will connect with the separate sewer system now being designed for the entire city. Meantime the sewage will flow throught the proposed extension and existing sewers to the Water street district outlet to a point in Conestoga Creek in the lower part of the city and about seven miles down stream from the water works pumping station. Temporary sanction of this sewer outlet was unanimously given by the Governor, Attorney General and Commissioner of Health in a sewerage permit issued by the Commissioner of Health during the year one thousand nine hundred and six to the city of Lancaster.

The proposed sewer extension is purely a lateral sewer and the proposed summit is its final terminus.

It has been determined that a permit should be granted and is hereby and herein granted for the proposed sewer extension under the following conditions and stipulations:

FIRST: That the proposed sewer shall be constructed in conformity with the plan filed with the application, shall be used as a sanitary sewer only and that eventually it shall be incorporated in the sanitary sewerage system for which plans are now being prepared by the city.

SECOND: It is especially stipulated that this permit shall in no way limit or affect the terms of the sewerage permit issued by the Commissioner of Health to the city of Lancaster on May seventeenth, one thousand nine hundred and six, but shall operate as an extension of the said one thousand nine hundred and six permit to the proposed West Vine street sewer, under the further conditions herein stipulated.

Attention of the city authorities is called to the fact that the administration of the law of nineteen hundred and five does not contemplate the continuous application to the State authorities for petty sewer extensions, and that, therefore, as soon as the terms of the sewerage permit of nineteen hundred and six to said city shall have been complied with, a general permit for the extension of sewers anywhere within the municipal limits, in conformity with the comprehensive plan to be prepared and filed with the State Department of Health, will be issued. It is only because the city has delayed to fulfill the terms of said permit that at this time it is necessary for a special application to be made for the construction of the public sewer in Vine street.

Harrisburg, Pa., October 22nd, 1907.

LANCASTER, LANCASTER COUNTY.

This application was made by the city of Lancaster, Lancaster county, and is for permission to make three lateral sewer extensions at summits, and to discharge the sewage therefrom into existing sewers, which are a part of the Water street sewer system, or Drainage District Number One, so-called.

It appears that in the city of Lancaster in the northwestern portion thereof, on a street known as Lemon street from College avenue westerly, at the present time there are several new dwelling houses which have been erected and provided with modern sanitary facilities in anticipation of a public sewer, the owner of which has been denied permission by the city to lay a private sewer in said Lemon street, easterly to the public sewer at the corner of College avenue, for the reason, so it is alleged, that a public sewer in said street, of a size and depth and grade adapted to serve not only said owners dwelling but others on the line of this street as far as President avenue, where the final terminus of the sewer should ultimately be located, is contemplated by the city.

It further appears that in the north central part of the city on Market street between Lemon and James streets, where there is a private sewer now, street paving is about to be laid down by the city and that a contract has been let therefor but operations are suspended pending the construction of a public sewer in the street.

It also appears that in the central part of the city at the junction of Manor and West King streets certain improvements in surface drainage are required for the convenience and safety of public travel, and that the city proposes to lay a storm drain in Manor street to the summit, a distance of about three hundred and fifty feet. The dwellings on either side of this highway at present dispose of sewage into cess-pools. It is the purpose of the city, in connection with the storm drain, to also construct a sanitary sewer.

It is for permission to make these three improvements that application is now made. All three sewers will be separate and for the present will discharge into a combined sewer. The Lemon street sewer is to be ten inches in diameter and twenty-two hundred feet long. Six hundred feet only will be built at this time. The sewer will discharge into a twenty-four inch combined sewer at College avenue. The Market street sewer will be an eight inch pipe about five hundred feet long and will empty into a combined sewer three feet in diameter in Lemon street. The Manor sewer will be an eight inch pipe three hundred and fifty feet long and is to discharge into a three foot storm sewer in West King street.

The sewers are to be permanently constructed, will receive sewage only, and ultimately will connect with the separate sewer system now being designed for the entire city. Meantime, the sewage will flow through the proposed extensions and existing sewers to the Water street district outlet and thence to a point in Conestoga Creek in the lower part of the city about seven miles down stream from the city water works pumping station. Temporary sanction of this sewer outlet was unanimously given by the Governor, Attorney General and Commissioner of Health in a sewerage permit issued by the Commissioner of Health during nineteen hundred and six to the city of Lancaster.

It is hereby unanimously agreed that the interests of the public health require that a permit be granted and it is hereby and herein granted to the city of Lancaster to build the proposed sewer extensions, under the following conditions and stipulations:

FIRST: That the proposed sewers shall be constructed in conformity with the plans thereof filed with the application, and shall be used as sanitary sewers only, and eventually they shall be incorporated into the sanitary sewerage system for the Water street district or Drainage District No. 1, so-called, for which plans are now being prepared by the city.

SECOND: It is specially stipulated that this permit shall operate as an extension of the said sewerage permit of nineteen hundred and six only in so far as it relates to the three particular sewers herein approved.

The attention of the city authorities is again called to the fact that the administration of the law of nineteen hundred and five does not contemplate the continuous application to the State authorities for petty sewer extensions and that, therefore, as soon as the terms of the sewerage permit of nineteen hundred and six to said city shall have been complied with, a general permit for the extension of sewers any where within the municipal limits, in conformity with the comprehensive plan to be prepared and filed with the State Department of Health, will be issued. It is only because the city has delayed to fulfill the terms of said permit that at this time it is necessary for a special application to be made for the construction of a public sewer in Lemon street, in Market street and in Manor street.

Harrisburg, Pa., December 4th, 1907.

LANCASTER, LANCASTER COUNTY.

This application was made by the city of Lancaster, Lancaster county, Pennsylvania, and is for approval of plans for a sanitary sewer system for a portion of said city, and permission to discharge sewage therefrom into the Conestoga Creek at the present outlet of the Clay and Lemon street district.

On May seventeenth, nineteen hundred and six, the Commissioner of Health issued a permit to the city of Lancaster to extend its sewerage system by arching Gas Run and to use the same as a sewer for the discharge of sewage about five hundred thousand gallons, divided into two compartments, each into the Conestoga Creek under certain conditions among which were the following:

"FIRST: That on or before May first, nineteen hundred and seven, the city shall submit a plan for a separate system of sewerage, so called, comprising a system of sewers into which the discharge of roof or surface water shall be excluded, and whose object shall be to provide for the collection of all of the sewage of the city and its speedy removal to one or more common point or points where the sewage shall be treated according to a plan to be prepared by the city and submitted for approval to the Commissioner of Health when called for by him."

The date in the permit up to which the discharge of sewage into Conestoga Creek may be discharged under State approval was stipulated to be May first, nineteen hundred and seven, but with the following provisions:

""That on May first, nineteen hundred and seven, provided the city of Lancaster has complied with the above condition, the Commissioner of Health may extend the time and fix the date of said extension wherein the city of Lancaster may discharge sewage from its sewers into Conestoga Creek, provided still further, that the city of Lancaster shall have constructed on or before said date, a dam across the Conestoga Creek at a point near and just below the present city water works intake, according to plans drawn by F. H. Shaw and on file in the office of the Commissioner of Health, or in substantial accordance therewith, whereby means may be afforded for preventing sewage from any of the city sewers or from the pumping station, dwellings in the vicinity and wash water from the filter plant, from reaching the said intake."

In compliance with the spirit of this permit and in anticipation of carrying out its requirements, the city laid and built in the masonry on either side of said Gas Run storm sewer an eighteen inch pipe, which pipes will be the main intercepters for the separate sewer system of the Gas Run drainage district when the separate system for this part of the city shall have been completed.

The special sewerage commission of the city of Lancaster were not authorized by councils to have plans prepared for a system of sanitary sewers for said city until August twenty-second, nineteen hundred and seven whereupon plans have been prepared and are now presented for a system of sanitary sewers for a portion of Drainage District Number two of said city. Other plans for other portions of the city are in process of design and will be submitted in the near future, so it is stated. The petitioners represent that there is great urgency for the immediate construction of sewers in a part of said district number two.

The said district number two is locally known as the Clay Street Drainage District. It contains four hundred and three acres within the city limits and four hundred and ninety-three acres outside, being a total of eight hundred and ninety-six acres. It is in the north and northeast corner of the city and has a population of over six thousand of which one thousand are outside the city limits. It was formerly drained by a run extending easterly paralleling the Pennsylvania Railroad to the Conestoga Creek. The Shippen street sewer, six feet in diameter, and the Clay street sewer twenty-four inches in diameter, emptied into this run at Shippen street; other sewers emptied into it further down. Since nineteen hundred and three, a sewer varying in size from seven

feet in diameter from Shippen street to ten feet in diameter at the Conestoga Creek, has been built as a substitute for the run, and the run has been filled in and abandoned from the creek up as far as Marchall street where the silk mills are located. These mills are in the township of Manheim just over the city line. Above Marshall street to Shippen street, a distance of two thousand feet, the run is still open for portions of the way in the township and the sewage from the dwellings outside the city limits and the drainage from the Union stock yards is discharged into this open stretch of the run and diverted into the Clay street sewer extension at Marshall street. It is questionable whether the open run will be filled in and abandoned as was the originall intention until a sewer be substituted therefor.

Within the district but just over the city line in the township and between it and the Pennsylvania Railroad cut-off is the tract of land about forty-three acres in extent owned by the Lancaster Development Company and the Armstrong Cork Company where a large linoleum manufacturing plant is being erected and houses built for the accommodation of the employees.

Also in North Lancaster within the city limits and in the said drainage district are the buildings of the Franklin and Marshall College the sewage of which is now discharged into cess-pools. These cess-pools are inadequate and there is urgent, need, so the College President represents, for sewerage facilities.

In the vicinity of Hand avenue in the eastern section of the Clay street drainage district there are also building operations which call for modern sewerage facilities.

Sewers for these three sections, the Hand avenue, college and linoleum plant neighborhoods were made the subject of an application to the Commissioner of Health by the city of Lancaster on September ninth, nineteen hundred and seven and in response thereto the Commissioner of Health replied as follows:

"I have your application of September ninth, for approval of certain sewer extensions in Lancaster before me. I beg to call to your attention the fact that these sewers have not been laid in conformity with the requirements of a sewerage permit issued by me to the city under unanimous agreement of the Governor, Attorney General and Commissioner of Health. That decree called for the submission of a comprehensive sewerage plan for the collection of the sewage of the city and its ultimate treatment. The sewers you ask me to approve are not a part of such a proposed plan, or if they be, the Department is not made aware of it. I am therefore obliged to withhold approval of these plans for the present. You of course know that conduits for the removal of storm water only do not have to be approved by the State authorities. As soon as the comprehensive sewerage plan has been submitted, and I am informed by your Mayor that such plans will be forthcoming, a general permit will undoubtedly be issued whereunder from time to time in the future you will extend the sewers as necessity may demand without further application to the State."

The application now under consideration of November twenty-second, nineteen hundred and seven includes the three sections described in the said application of September ninth, and all of the Clay street drainage district within the city limits and for the territory outside of the city limits in the township. A sewer is provided for every street and in a majority of cases the sewer will be eight inches in diameter. Manholes will be provided at street intersections and at changes in line and grade, ventilation will be effected through manhole covers and the grades are such as to assure cleansing velocities. The size of the outlet will not exceed twenty-four inches in diameter. This is not to be built at the present time. Temporary connections are to be made with the Clay street combined sewer until the system shall have been completed and the time shall have arrived for the discontinuance of the discharge of sewage into the creek, at which time the various temporary outlets into the storm sewer will be abandoned and the separate trunk sewer built.

The policy of procedure will be to construct sanitary sewers in streets where there are no combined sewers at the present time, providing for storm drainage in the streets by shallow drains. The sewers now in existence and receiving sewage and storm water are to be continued as combined sewers until it becomes necessary to separate the sewage from the storm water.

The linoleum plant district and the College avenue district and the Hand avenue district are to be sewered on the separate plan immediately, and the other extensions to the comprehensive system for the Clay street district will be made from time to time as demanded.

The present sewer outlet and hence the proposed sewer outlet for Clay street drainage district is into Conestoga Creek at a point twelve hundred feet below the intake of the city water works plant and about one-quarter of a mile above Ranck's mill dam, owned by the city and leased some times as a mill privilege. A private corporation owns and operates a filter plant and delivers filtered water to the city's pumping station, where prior to nineteen hundred and six, raw creek water was drawn from the stream and delivered to the consumers.

The drainage area of the Conestoga above the water works intake is about three hundred and ten square miles. On this area there are nineteen townships and five boroughs with a total population in nineteen hundred of thirty-six

thousand five hundred. Almost all of the water-shed is rolling farm lands under high cultivation and a dense rural popoulation amounting to one hundred and eighteen to the square mile. The sources of sewage contamination of Lancaster's water supply are therefore numerous. Before the filter was installed, there had been outbreaks of typhoid fever attributed to the public water supply. If the filter plant should fail to properly purify the water, or should be temporarily put out of commission by reason of accident or otherwise, a recurrence of typhoid fever would probably follow. The State Department of Health has during the last six months, made a sanitary survey of the entire water-shed and is now engaged in bringing about removal of all menaces thereon with a view of preserving the purity of these waters for the protection of the public health.

Particular stress may with propriety be laid upon the fact, that while large amounts of sewage may not be discharged into the creek at any point above the intake, the quantity of the waste material which enters the streams from the whole water-shed must be in the aggregate very great. Pollutions of small streams by rural population are very irregular in amount; but occasionally they give rise to very grave consequences, as evidenced by several of the large typhoid epidemics in Pennsylvania. The conditions upon the Conestoga Creek being favorable for the transmission of infection, the fact that Lancaster has thus far escaped a very great epidemic cannot be taken to indicate the safety of the present condition. The treatment of water may not necessarily remove all poison from it and a breakdown may cause raw water to be supplied to the consumers. These considerations having been deemed important enough to call for the work by the State Department of Health on the water-sheds as above mentioned would render highly inconsistent any decision of the Commissioner of Health whereby the city of Lancaster were permitted to pollute its own water supply.

The flow of the creek is comparatively small in continued dry weather. The city of Lancaster is now using six million gallons or more of water daily, and during the summer just passed the pumping rates were as high as nine million gallons per twenty-four hours for parts of a day. The creek has thus far supplied the necessities of the city, but it is a serious question of how far the creek can be relied upon to meet increased consumption. In eighteen hundred and ninety-six, during a long, dry time, no water flowed over the dam located immediately below the intake, and since washed out, and in fact, the water level in the dam was lowered a couple of feet. This condition is said to have lasted a week. At the same time, the amount of water pumped was less than seven million gallons per day. Some leakage occurred at the dam. The total flow of the stream, with a perfectly tight dam, did not exceed eight million gallons, or equivalent to four-one-hundredths cubic feet per second per square mile of water-shed which is comparable with the known yield of other streams drainage similar county. It appears, then, that eight million gallons is all the water which it is safe to depend upon in the creek in periods of drought. The city is now using three-fourths of this quantity on an average, and the maximum daily consumption is equal to, and even exceeds the minimum flow of the creek. During nineteen hundred and seven when the flow was diminished temporarily by the storing of water at the various mill dams on the stream above, and by scarcity of rainfall, the entire flow of the Conestoga was diverted to the filter plant, and this was insufficient so that some water was drawn from the pool below. Into this pool the Clay street ten foot sewer empties its contents, and at a point as previously stated twelve hundred feet only below the water works intake. It may be that a drought may occur when even less water will be available than was the case in eighteen hundred and ninety-six.

Ranck's mill dam is fifteen hundred and fifty feet down stream from the Clay street sewer outlet, and hence twenty-seven hundred and fifty feet below the water works intake. The pool formed by this dam extends up-stream beyond the water works intake, and backs the water up about four feet deep in the Clay street sewer. At ordinary water stages, it is not probable that any sewage from the city sewer would reach the water works intake, but when the consumption is equivalent to the flow of the creek, the danger from this source is very great. The sewer outlet should be changed or something done to prevent its contaminating the city water supply. The sewage from the pumping station, and the wash water from the filter plant should also be excluded from the pool out of which the city's drinking water is taken.

The most effectual and same time cheapest remedy, is the construction of a dam across the creek just below the water works intake. The sewage and waste water from the pump and filter works and adjacent buildings should be conducted to the creek below this dam until otherwise disposed of. Thus any possibility of an up-stream flow of sewage would be prevented.

Since the permit of May seventeenth, nineteen hundred and six bids were asked and received by the city for the said dam at the pumping plant. The figures ran so high, however, that it was considered expedient to defer construction in the hope that the Clay and Lemon street outlet sewer could be

extended down stream below Ranck's mill dam for a less expenditure, and thus obviate the necessity of the new dam. The interests of the public health in this case, are, and should be considered by the local authorities, to be paramount to other considerations. A dam without a highway bridge and piers should be built for about twelve thousand dollars. Such a sum would be totally insufficient to intercept the sewage from the Clay street district and the Lemon street district, and from the filter and pumping plant, including storm water and convey it below Ranck's dam.

It has been determined that the interests of the public health demand that approval be given for the plans of the proposed sanitary sewer system for the Clay street drainage district and that permission be granted for the discharge of the sewage therefrom into Conestoga Creek at the present outlet of the Clay and Lemon street district under the following conditions and stipulations:

FIRST: This permit to discharge sewage into the Conestoga Creek shall cease on the first day of January, nineteen hundred and ten, and provided the other terms of the permit shall have been complied with, on said date, the Commissioner of Health may extend the time in which sewage may continue to be discharged from the proposed sewers into the waters of the State. But if on or before January first, nineteen hundred and nine, the city of Lancaster has not erected, or taken active steps to erect a dam across the creek immediately below the water works intake, in accordance with plans to be prepared and submitted to the Commissioner of Health for approval as a part of the completion of the sewerage improvements, as fully hereinbefore outlined, then on January first, nineteen hundred and nine, the discharge of sewage into the waters of the State from the sewers herein approved shall be without State sanction and render the city liable to the penalty prescribed by law for the discharge of sewage without a permit.

SECOND: This permit is also given under the express stipulation that the submission of the plans of the comprehensive sewerage system for the entire city, called for in the said permit of May seventeenth, nineteen hundred and six, shall be submitted to the Commissioner of Health not later than March first, nineteen hundred and eight.

THIRD: At the close of each season's work, the city shall prepare a plan of the sewers laid in the proposed sewerage district during the year, and file the same with the State Department of Health together with such other information in relation thereto as may be required.

FOURTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

FIFTH: If at any time it appears to the State Department of Health that the sewer system or any part thereof, has become a nuisance or a menace, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise, but this relates more particularly to the functions of the sewers themselves. All roof and storm water shall be excluded from the sewers or if admitted, the admission shall be temporarily only and under terms whereby the absolute exclusion from the sewers of all such waters shall be effected when the time shall have arrived for some other disposal of the sewage than into the Conestoga Creek at the point now approved.

SIXTH: The importance of careful construction of the sanitary sewers, the making of the points of the pipes water tight and the maintenance of the sewer intact and water tight thereafter, cannot be overstated. It is stipulated that the proposed sewers shall be constructed under competent engineering supervision and inspection and that a record of all connections with the sewer system shall be kept by the city. Attention to these details now will render more efficient and economical such works as shall ultimately be adopted for the proper disposition of the city sewage.

Harrisburg, Pa., December 5th, 1907.

LOWER MERION TOWNSHIP, MONTGOMERY COUNTY.

This application was made by the township of Lower Merion, Montgomery county, and is for permission to extend the existing sewerage system and to discharge the sewage from such extensions through the existing sewers into the city of Philadelphia system.

It appears that Lower Merion township is in the extreme southern corner of Montgomery county, being bounded on the north by Upper Merion township, West Conshohocken borough and the Schuylkill River; on the east by said river; on the south by the city of Philadelphia; and on the west by the townships of Haverford and Radnor in Delaware county. The area so incorporated is a populous one, grouped in villages known as Overbrook, Merion, Narberth, Wynnewood, Ardmore, Haverford, Bryn Mawr and Rosemont, located along the main line of the Pennsylvania Railroad in the order named from the city of Philadelphia line. Narberth is an incorporated borough, and lies wholly within Lower Merion township.

The railroad passes along the western portion of the township, about on the summit, the territory north of it and east of it comprising about five-sixths of the township area, drains into the Schuylkill River, the remaining portion draining into tributaries of Cobbs Creek, which below the township is the boundary line between Philadelphia and Delaware county, and empties into the Delaware River about six miles below the mouth of the Schuylkill.

Outside of the settlements, the township is generally occupied by magnificent country estates under high state of cultivation and is renowned as a suburban district.

Several years ago a sanitary system of sewerage was designed for the township, which provided for the collection of house drainage and its discharge into the sewer system of the city of Philadelphia at convenient points. Owing to the topography, only a part of the territory could be served with sewers, whose mains could be discharged by gravity into the city of Philadelphia's system, and, therefore, the plan provided that the sewage from the other part lying in the Schuylkill water-shed, should be collected by gravity at a pumping station to be located at a low point on Mill Creek, a tributary of the river, from whence the sewage should be lifted by pumps over into the district of one of the gravity main outfalls. The plan also provided for a pumping station to serve a low district in the Cobb Creek valley.

For convenience, the township was divided into seven sewerage districts. Section one comprised Ardmore and Haverford and the gravity main therefrom has been built and connected with the city of Philadelphia's sewer at Sixty-sixth street. This main is twenty-four inches in diameter and passes by Narberth borough, the intention being that the main should receive the sewage from Narberth as well as from all the territory tributary to it in the township. Section number two is west of Section number one in the Cobb Creek valley and its sewerage is pumped up into the gravity main, which serves Section One. Section Number Three is east of Section Number One in Mill Creek valley, and its sewage drains to the pumping station on Mill Creek, as does the sewage from Section number Six and Number Seven, which comprises Bryn Mawr, Rosemont and the country to the north and east. The pumps at the Mill Creek station force the sewage up into the gravity main leading from Section Number One to the city sewer at Sixty-sixth street. Sections Four and Five are in the south-east corner of the township and drain naturally towards the city of Philadelphia line. The sewers in Section Number Five have two outlets into the city of Philadelphia system, one at Forty-ninth street and the other at Fifty-first street. The sewers in Section Four also have two outlets, one at Fifty-seventh street and also with the city sewer at the Overbrook station.

It appears that an ordinance was passed by the Select and Common Councils of the city of Philadelphia on June thirtieth, nineteen hundred and two, providing for the connection of certain sewers to be constructed by the township of Lower Merion, with certain sewers of the city of Philadelphia, as follows:

At City avenue and Conshohocken avenue.
At City avenue and Fifty-first street.
At City avenue and Fifty-ninth street.
At City avenue and Sixty-sixth street.
Also at Overbrook Station.

Among other things it was stipulated in the ordinance, that domestic drainage only shall be received into the township sewerage system and be discharged into the city sewers. Also that in case the city of Philadelphia shall ever change the method of disposal of sewage or drainage by treatment or otherwisewise, the township shall pay its proportion of the cost of such treatment or other disposal as determined by the number of cubic feet of sewage discharged by said township into the city sewers. And, further, that upon failure by said township to make the annual payments provided for in the ordinance, the city may thereupon disconnect the outlet of the sewers of said township from the city sewer system.

It further appears that Lower Merion township commenced the construction of its system of sewers and entered an agreement on September second, nineteen hundred and three, with the city of Philadelphia to connect with the city sewers in accordance with the terms of said ordinance.

The Township Commissioners did not build all of the sewer system as then laid out, a part only of the sewers in each section having been constructed and put in operation prior to the approval of the act one hundred and eighty-two, April twenty-second, nineteen hundred and five, since which date application was made to and approved by the Commissioner of Health for extensions of the system in the Merion Creek drainage area. The borough of Narberth has also made application for permission to construct a system of sewers and to discharge therefrom into the Lower Merion system, in conformity with the original design.

It is for permission to build two lateral sewers in Section Number Three, which will discharge into a sewer leading into Mill Creek pumping station, in conformity with the original plan, that application is now made. Both sewers

are to be eight inches in diameter and receive house sewage only. The sewer in Mill Creek Road is to be seventeen hundred feet in length, and the Valley Road sewer connecting with it, is to be twelve hundred and fifty feet in length.

In view of all the facts, it has been unanimously determined that the interests of the public health demand that permission be granted to the township of Lower Merion, and it is hereby and herein granted to said township to construct the proposed sanitary sewers, as proposed, under the following conditions:

FIRST: That the terms of the agreement entered into on the second day of September nineteen hundred and three by and between the township of Lower Merion and the city of Philadelphia, shall be fully complied with.

SECOND: That plans and profiles of the sewers as built, shall be filed with the Commissioner of Health.

THIRD: If any other method of sewage disposal, or any other plan of disposal than the one now proposed, becomes necessary at any time, plans therefor shall be submitted to the Commissioner of Health for his advice and approval, and he may modify, amend or approve the same, and fix rules and regulations therefor.

FOURTH: No pathological material from any laboratory shall be permitted to discharge into the system. The proper authorities shall cause these wastes to be incinerated on the premises.

FIFTH: If for any reason, the sewer system or any part thereof, becomes at any time a nuisance or menace to public health, in the opinion of the Commissioner of Health such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

SIXTH: The township shall cause to be prepared and filed in the office of the Commissioner of Health a plan or plans of all sewers now built, with their sizes, and grades, and showing thereon, all proposed extensions necessary to make the system complete, which plans shall be filed on or before the last day of March, nineteen hundred and seven.

The attention of the authorities should be called to the desirability of an application being made to the Commissioner of Health for approval of such additions of lateral sewers to the sewerage system as originally designed or since modified, as may be required from time to time in the future, in order that the works of the local and State authorities, having by law charge of such additions, may be expedited.

Harrisburg, Pa., January 4th, 1907.

LOWER TOWAMENSING TOWNSHIP, PALMERTON, CARBON COUNTY.

New Jersey Zinc Company of Pennsylvania.

This application was made by the New Jersey Zinc Company of Pennsylvania, village of Palmerton, Lower Towamensing township, Carbon county, Pennsylvania and is for approval of plans for sewerage and sewage disposal for the plant of the said company.

It appears that the manufacturing plant of the New Jersey Zinc Company of Pennsylvania is located on the north bank of the Lehigh River, in Lower Towamensing township Carbon county, beginning at the Aqueshicola Creek which comes down from the east, draining the north slope of the Kittatinny Ridge and emptying into the river just above Lehigh Gap. The property of said company extends up the valley of this creek and northward along the bank of the Lehigh River for a distance of one and a half miles in each direction. Fourteen hundred persons are employed at the works, and this number is likely to be increased in the future because the plant is being rapidly extended.

For the accommodation of its employes, the company has laid out the village of Palmerton, which is located on the north bank of the Aquashicola Creek, erected many dwellings, etsablished a water works system, sewerage and electric lights, and maintains an active interest in the administration of local matters for the health and well being of the citizens of the village. The present population is estimated to be in the neighborhood of eighteen hundred. The tract occupied by the shops and buildings at the works of the company is distant about a mile from the village, and connecting the two is a railroad owned and operated by the company. This tract is hemed in between the river on the south and the mountain on the north distant about one thousand feet. At the foot of the slope extending along the tracks of the Central Railroad of New Jersey, and following the river bank is the canal of the Lehigh Navigation Company. Between the two is the land upon which the buildings of the zinc company are located.

The raw products received at this plant are, the zinc ore from New Jersey, limestone and anthracite coal, besides a few minor chemicals.

The finished products comprise white oxide of zinc, spelter's zinc, sulphuric acid, lithopone and spiegeleisen.

In the process of manufacture of white oxide of zinc, the ore is vaporized, and the vapor is then oxidized in its transit to the bag-house, where facilities are afforded for the escapement of the gases and the collection of zinc in the form of oxide, in which form it is a dry powder resembling a very fine quality or flour. Thus it is shipped in barrels.

The furnaces are operated by forced draught, and the cooling of the fan shafts requires a considerable volume of water. This is discharged into the main storm water drain of the works at a temperature of about seventy degrees.

Some of the residium from the oxide furnaces contains iron in sufficient quantities to render it profitable for reclamation. This is accomplised in blast furnaces of which there are two, a third one being contemplated. These furnaces are of the ordinary type—water cooled. About one million gallons daily of water are used at each furnace, and from there it is discharged directly into the main storm drain of the plant, and thence into the Lehigh River.

The liquid waste from the process of sulphuric acid manufacture is discharged largely, if not wholly, upon the cinder bank in the vicinity of this part of the plant. Any of this liquid which does not soak away in the cinder bed would naturally find its way through an open ditch under the canal and eventually to the river. The river at this point contains mine drainage to a sufficient extent to render the water undesirable for general manufacturing purposes.

In the spelter process the zinc ore is roasted by heat produced by burning gases manufactured on the premises, resulting fumes from this roasting process being condensed and the result being a liquid zinc, which when cooled represents the marketable article called spelter. No liquid wastes, whatever, are produced. Various parts or mechanisms of the plant are water-jacketed and drainage therefrom goes to the main storm drain.

The steam engine plant is condensing and the drainage is also discharged into the main storm drain.

The company obtains its water supply from the Pohopoco Creek, entering the Lehigh River at Parryville, six miles above the plant. Water is brought down in a thirty inch gravity main terminating at the pump suctions at the engine house. Here there are installed six pumping engines, by means of which water is delivered to all parts of the plant and also to the water works system of Palmerton village. The total daily consumption for all purposes is about nine million gallons.

During the spring and summer of the year one thousand nine hundred and six, there was an outbreak of typhoid fever in Palmerton, attributable to the pollution of Pohopoco Creek. On application from the Company, the State Department made an inspection of the sources of pollution on the water-shed and ordered their abatement. Immediately upon the outbreak of the typhoid epidemic, totaling eighty cases in six months, the company drilled a well at its plant for the purpose of securing, if possible, a temporary supply of pure water for domestic uses in the village. The ground supply was furnished for the first time about the middle of May, since which time it has been the only source of supply to the village. The water, however, is extremely hard and very unsatisfactory on this account. The creek water, however, is in use at the works. There is an emergency intake from the river to the pumping station which is maintained for use in case of accident to the gravity supply main from the creek. The main leading from Parryville is laid in the bed or along the banks of the Lehigh River and at numerous places is necessarily exposed.

A vigilant patrol of the Pohopoco Creek water-shed is maintained and the State is prompt in removing any nuisance or menace thereon reported. Owners of property have been required to go to considerable expense in providing water tight receptacles for sewage. The Zinc Company upholds the sanitary policy of the State with respect to the discharge of sewage into any body of water used for drinking purposes and since the Lehigh River is a source of supply to the public in Bethlehem, lower down stream, and since at present some of the sewage from the Zinc Company's works is discharged into the river, the said company has been prompt to voluntarily propose to discontinue such discharge.

At the present time masonry privy vaults are in use at the company's plant, with two exceptions. There is a water closet at the general office and at the laboratory, and all sewage from these two buildings is discharged into a sewer which empties into the storm water drain previously referred to. This drain, where it passes under the canal to the river, is reported to be thirty inches in diameter. It removes roof and storm water from the upper half of the plant. The water course above referred to serves a similar purpose for the lower half of the plant.

The petitioners represent that a system of sewers and sewage disposal works is necessary for the convenience of the workmen about the plant and for the protection of the general health of the communty. The plans submitted contemplate the construction of a system of sanitary sewers into which is to be admitted sewage only, and for the erection of intermittent sand filters for the treatment of the sewage. At present the water-tight receptacles for sewage

require cleaning out continually. The contents are removed in wagons to farm lands in the vicinity. The cleaning process is a nuisance both to the company and to the neighborhood at large.

The proposed system contemplates the erection of seventeen comfort stations, to be located at convenient places throughout the plant. The arrangement is of special design, adopted by the company after experiments. Each station is to consist of a range closet for a seating capacity of from five to seven people, and flushed by automatic tank discharging twenty-five gallons every half hour, more or less.

The sewers are to range in size from five to twelve inches in diameter laid on grades sufficient to maintain a cleansing velocity, to be provided by manholes at changes in line and grade of suitable construction to admit of inspection and proper maintenance, and to comprise all told a total length of eighty-six hundred feet.

The disposal plant is to consist of a dosing chamber and four sand filter beds, No attempt to store the sewage or to obtain the liquefaction of the solids is made. The intention of the design is to convey the sewage to the filter beds while it is in a fresh condition. The dosing tank is provided for the purpose of effecting economical and satisfactory distributions of the sewage over the surface of the beds. This tank is to be built of concrete bottom and sides, thirty-six feet long, eighteen feet wide and two and a half feet in depth to the flow line. The sewage in passing into the tank is to enter through a screen chamber. It is to be operated by a syphon set to discharge when the tank fills to the depth of two and a half feet, giving a flush volume of thirteen thousand gallons, to which should be added about one thousand gallons inflow during the period of discharge which is designated to be twenty minutes to one-half hour. The total daily output from the works is estimated at forty thousand gallons. The works are operated day and night so that the flow of sewage will be fairly uniform during the twenty-four hours of the day.

The filters are to be built of good sand, to be obtained by crushing sandstone rock quarried in the vicinity by the McFarland Sand Company, which is extensively engaged in this line of business. The filters are to be one hundred feet wide by two hundred feet long, divided on the surface into four compartments, each fifty feet wide by one hundred feet long. Excavations in the natural earth are to be made, four inch underdrains (laid in parallel lines twenty feet apart, connecting to a main drain extending longitudinally through the center of the four beds) are to be laid on the floor over which is to be placed four and a half feet of sand. The sewage from the dosing tank is to be delivered through a twelve inch pipe into a central gate chamber from which it may be diverted either into one or both of two secondary gate chambers, from which surface sluice boxes are to extend longitudinally across each filter, by means of which sewage is to be discharged in the surface of each compartment. The total area of the four beds is equivalent to one-half acre, and to the estimated output of sewage from the works will give a filtering area equivalent to eighty thousand gallons of sewage per acre daily. This rate has been demonstrated by experience to be a normal one, and with careful operation of the beds, should be capable of producing an effluent of high purity.

The effluent from the filter beds is to be discharged by means of a ten inch pipe into an effluent chamber having a division wall with four five inch flop valves, by means of which sewage or river water in high stages will be prevented from backflooding into the underdrainage system. This keeps a water seal on the under drain and will keep animals out of the pipes. From this chamber a ten inch pipe is to conduct the effluent to a culvert which passes under the canal to the river. The filter beds are located along the canal near the said culvert. This location is near the down stream end of the tract upon which the company's works are located. The surface of the filter beds is to be three hundred and ninety-two. The normal level of the river water is three hundred and eighty-two. The elevation of the water in the canal is three hundred and ninety-four. The mean high water in the river is about three hundred and eighty-six, which is to be the elevation of the ten inch effluent pipe at the effluent chamber. In the year one thousand nine hundred and two, the Lehigh River reached the elevation of four hundred, so that practically the entire tract upon which the works are located was under water. A high water like this is reported to have occurred in the year one thousand eight hundred and sixty-two. So it appears that the filter beds will be in commission during the ordinary freshets except possibly for a short period of a few hours. In the event of an extraordinary flood stage the entire plant will be out of commission.

The proposed plans are well conceived and designed according to the best practice in sanitary engineering. The law does not permit the Commissioner of Health to grant permission to a private corporation to discharge sewage into any of the waters of the State. Further, it is not necessary for such a corporation to make application to the State Department of Health for approval of plans for the treatment of sewage, but since the State has by law

forced corporations like the New Jersey Zinc Company of Pennsylvania to go to large expenditure in preparing sewerage and sewage disposal works, and since a corporation seeking to comply with this law and making an expenditure of twenty-five thousand dollars, such as that contemplated in the present instance, may reasonably expect the co-operation and advice of the State Department of Health, it has been determined to be good public policy for the Commissioner of Health to approve plans under certain conditions and stipulations.

It has been determined that the interests of the public health demand that approval be given and it is hereby and herein given to the proposed sewerage and sewage disposal plants and a permit granted therefor under the following conditions and stipulations:

FIRST: That when the works shall have been completed, detailed plans of the filter beds and dosing tanks with their appliances and appurtenances shall be prepared and filed in the Department of Health.

SECOND: Relative to the operation of the disposal works, records shall be kept by the Zinc Company on such blank forms as shall be furnished by the State Department of Health.

THIRD: If at any time in the future it shall appear that the filters are becoming overtaxed or not properly performing their work, then the plant shall be enlarged and improved, or such remedial measures adopted as the said Zinc Company shall suggest or propose, which suggestions and propositions shall be made in writing, accompanied by plans and adequate information, and submitted to the Commissioner of Health for approval; and the Commissioner of Health may amend or approve said plans or measures and stipulate the conditions under which approval thereof is given.

Harrisburg, Pa., July 6th, 1907.

MARCUS HOOK, DELAWARE COUNTY.

This application was made by the borough of Marcus Hook, Delaware county, and is for permission to construct a sewer outlet into the Delaware River within said borough limits.

It appears that the borough of Marcus Hook has a population of about fifteen hundred and is located on the north bank of the Delaware River in the extreme southern part of Delaware county about three miles below the center of the city of Chester. To the west is the State of Delaware and to the north and east the township of Lower Chichester, Pennsylvania. The Pennsylvania Railroad extends parallel to the river along the northern boundary of the borough. Marcus Hook Creek, which rises in the State of Pennsylvania, is about four miles to the north and is the eastern boundary. The land bordering the river is from five to ten feet above high water mark for most part, and, back at the Pennsylvania Railroad at Market street, the principal highway at right angles to the river, the elevation is about twenty-five feet. The difference between high and low water, the Delaware River being a tidal stream here, is about five and one-half feet.

The State Quarantine Station is located on the river bank near the State line. There are several oil refineries in the town and a barrel factory. It is also a point of shipment of oil for export. There are also a number of citizens engaged in shad fishery. The Philadelphia and Reading Railway Company has a branch terminus in the village. The line parallels the river and extends to the city of Philadelphia. The local authorities are anxious to promote the industrial growth of the borough and it is reported that special inducements are offered to manufacturers.

The community at present obtains its drinking water from private wells. Many of these are dug through hard pan into the underlying gravel and the healthfulness of the water is questioned because of the common practice of dispensing of slops, garbage and other matters on the surface of the ground in proximity to wells where surface wash may easily pollute the domestic supply. At present there are three cases of typhoid fever which are attributed to polluted well water.

The New Chester Water Company has applied for permission to furnish Marcus Hook borough with its filtered water now supplied to the city of Chester and vicinity.

At present the borough is reported to be without sewers of public or private ownership. There are about three hundred dwellings served by surface privies generally poorly built and not efficiently cared for. There is a cesspool at the barrel factory. The oil refineries dispose of sewage in a similar manner, so it is reported. Other wastes find their way to the river which is apparent by the oil discernible upon the surface of the water.

The local authorities desire to construct a combined sewer in Market street and to be given permission to extend the same in lateral streets from time to time.

It is proposed to have the outlet three feet in diameter with its invert placed one foot above low water. The structure is to begin on the bank of the river and to extend at right angles thereto up the highway a distance of twelve hundred and fifty feet to Fourth street and thence in the same street a distance of twenty-seven hundred and fifty feet to the railroad; the sewer is to be an eighteen inch terra cotta pipe. The depth of the pipe sewer is not clearly shown on the plan with respect to the topography of the adjoining land and where it is represented that the sewer can serve as a main for a large tract of land on either side of Market street, an examination of the territory shows this possibility to be rather doubtful.

It is intended to deliver both sewage and storm water into the conduit. Provided the plan be approved, the question of issuing bonds to an amount sufficient to warrant the undertaking will be properly brought before the voters of the municipality. The estimated cost of constructing the Market street sewer is ten thousand dollars. At the present time the appraised valuation of Marcus Hook is seven hundred and thirty thousand dollars and the bonded indebtedness six thousand five hunred dollars, so it is reported. If this be true, then the borrowing capacity, at seven per cent., is in the neighborhood of forty-four thousand dollars, after having deducted the bonded indebtedness of six thousand five hundred dollars. The plan is to assess each property holder per front foot at a rate with interest which will amount to the total assessment at the expiraion of ten years.

It appears upon investigation that the plan of the Market street sewer was made without much study of the local conditions and future requirements. Along the river and back therefrom a little way, in the valley of a run which lies in the western half of the borough, there are some low house lots and other land which needs surface drainage to render it best adapted for occupancy. Generally speaking, north of Fifth street, which parallels the river, the slope of the ground is upward and surface drainage is fairly satisfactory. So from the standpoint of public health, whatever demands for improved surface drainage there may be, largely obtain in the said lower elevation of the borough. There are about four hundred acres incorporated now. The proposed three foot structure, owing to the flatness of the borough, would appear entirely inadequate to serve as an outlet for a system of surface water sewers for this area. Its contributing territory is more nearly fifty acres in extent. The town is too small to assume the cost of the construction of a combined system for the present built-up district on a plan adapted for extension into territory likely to be built up in the near future; but the borough's resources are now ample to provide for the installation of such a system for the reception of domestic sewage only. There is a common need for such a system, and there is not a common need for underground removal of rain water everywhere in the borough.

The problem of draining and improving the land lying low and covered in part at high or extreme freshet periods, is separate and distinct from the surface drainage problem of the higher territory probably, and entirely independent from the standpoint of necessity and economy with the problem of removing domestic sewage from the dwellings in the town.

The proposed plan of depositing the sewage on the bank of the river at the foot of Market street, where during certain periods of tide and wind, a nuisance would be very likely to be created, is objectionable. Both sides of the street are built up and the outlet in this neighborhood, if at all, should be far enough out into the river to obviate a local nuisance. The stream is in the neighborhood of a mile wide, the sewers of the city of Chester empty therein and so do those of Philadelphia and Camden. To this practice may be charged the prevalence of typhoid fever, the infection being transmitted through the medium of drinking water and sea foods, such as clams, oysters and fish. The diminution in the number of shad in the Delaware River has been frequently attributed by venerable fishermen to the gross pollution of the stream by sewage. Public sentiment with respect to the preservation of the purity of the waters of the State has become sufficiently enlightened to demand the ultimate discontinuance of such discharge. The city of Philadelphia, during the next five years, is to engage in the preparation of plans for changes in methods of disposal now in vogue there. Of course, until the great volume of Philadelphia sewage is removed from the river, it would be futile to remove the inconsiderable volumes discharged into the streams at points below Philadelphia, unless local conditions should render such removal necessary. However, some time in the future, all domestic sewage should be treated before being put into the river or its tributaries, and since this is the Commonwealth's policy, no local sewerage system should be designed contrary thereto. Therefore, the proposed plans for Marcus Hook must be modified.

The cost of treating storm water and sewage would be prohibitive. So also would be the construction of combined sewers. An eight inch sewer in Market street would be ample in size to remove domestic sewage from the territory tributary to it. The very great saving in cost between an eight inch sewer and a thirty inch sewer must be apparent.

The necessities of the town should be carefully studied by a competent engineer, and a plan devised for a sanitary sewer system for the entire borough, whose object should be to collect the sewage by gravity at one common point if feasible, from which in the future the sewage should be conveyed by pumpage to the purification plant. In the meantime such portions of this sewer system as may be needed may be built with a possible temporary discharge into the river, if this should be found necessary, and thus each year's expenditure may be a permanent expenditure and the work constructed be a part of a comprehensive whole.

The plan submitted by the petitioners and now before the Department for consideration does not and cannot serve this purpose and should not be approved. It appears that the borough is amply able to pay for a survey of the town and a comprehensive sewerage design, and the tax payers will find it very much to their advantage to proceed in this conservative way in so important an undertaking, more especially since the town wishes to afford proper inducements to prospective citizens. With an efficient and economical sewerage system adapted to ready extension and a public water supply, coupled with the natural advantages of location, Marcus Hook should witness the anticipated growth.

It has been determined that the interests of the public health demand that the proposed Market street sewer plan be disapproved and said plan is hereby and herein disapproved. And furthermore it has been agreed that the local authorities be advised, and they are hereby and herein advised, to employ a competent sanitary engineer to design a comprehensive system of sanitary sewerage, following out in a general way the suggestions herein offered, and that such plans and report thereof be submitted to the Department of Health for approval.

Harrisburg, Pa., November 2nd, 1907.

NARBERTH, MONTGOMERY COUNTY.

This application was made by the borough of Narberth, Montgomery county, and is for permission to build a system of sewers and to discharge the sewage therefrom into Lower Merion township sewer at said borough line, and permission is hereby and herein granted to said borough under the following conditions and stipulations:

FIRST: That permission to use the Lower Merion township sewer shall be first obtained from the authorities having by law charge of said township sewer system, which permission shall not conflict with the terms of an agreement entered into on the second day of September, nineteen hundred and three, by and between said township and the city of Philadelphia, and which permission before being operative shall be submitted to and approved by the Commissioner of Health.

SECOND: Plans and profiles of the sewers built each year shall be filed with the Commissioner of Health together with such other information relative thereto as he may require.

THIRD: If for any reason the sewer system or any part thereof becomes at any time a nuisance or menace to public health in the opinion of the Commissioner of Health, such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

FOURTH: If any other method of sewage disposal, or any other plan of disposal than the one now proposed and herein approved becomes necessary at any time, plans therefor shall be submitted to the Commissioner of Health for his advice and approval, and he may modify, amend or approve the same and establish rules and regulations in connection therewith.

FIFTH: No pathological material from any laboratory shall be permitted to discharge into the system. The proper authorities shall cause these wastes to be incinerated on the premises.

SIXTH: The borough shall proceed immediately in the construction of the proposed sewer system to provide sewers for the abatement of public nuisances now existing in the vicinity of Woodbine, Hamden and Iona avenues, and in the vicintiy of Narberth, Price and Wayne avenues.

SEVENTH: Provided the borough determines to purchase and incorporate the sewers of the Spring Garden Insurance Company into the sewer system of the borough, inspection man-holes shall be constructed on the said sewers of said company at street intersections and at change in line and grade, all roof and storm water shall be excluded from the sewers, and the borough shall cause the present sewage disposal plant of said company to be abandoned, the tanks shall be cleaned out of all organic matter, such matter be destroyed or properly disposed of, the tanks be filled up and the irrigation fields properly drained and restored to a sanitary condition.

EIGHTH: The proposed sewers shall be built under the direction and supervision of skilled engineers and every necessary effort in construction shall be adopted to build the sewers tight to preclude the entrance and seepage of

ground water into them. In some cases, where such precautions are not adopted, sanitary sewers run two-thirds full of ground water before a single house connection is made with the sewers, thereby rendering the entire sewer system inefficient and unsanitary.

NINTH: All roof and storm water and cellar drainage shall be excluded from the sewer, inspection man-holes shall be provided at all street intersections and at changes in line and grade of a sewer, tight man-holes rather than perforated man-hole covers should be adopted in order to keep out street water which would otherwise gain admission to the sewers and possibly surcharge them at times. Ventilation shall be obtained by untrapped house drains.

TENTH: The Commissioner of Health may require monthly reports of inspection and operation of the sewer system.

The attention of the borough authorities is hereby called to the desirability of having untrapped house connections with the sewers, thereby providing an air vent to the roof of the building.

Harrisburg, Pa., January 12th, 1907.

NEW CASTLE, LAWRENCE COUNTY.

This application was made by the city of New Castle and is for permission to extend its sewer system by the construction of sewers in Byers avenue, and in Harrison and Morton streets, and to discharge the sewage therefrom through the existing sewers into the Shenango River.

It appears that the Commissioner of Health had issued permits to the city of New Castle to extend its sewer system which permits were dated September twenty-first, one thousand nine hundred and five, and December second, one thousand nine hundred and five. Among other stipulations in said permits were the following:

"First, that the city take up the study of the sewage disposal problem and submit on or before the first day of September, one thousand nine hundred and six, to the Commissioner of Health for further consideration, a plan for the treatment of its sewage.

"Second, that a comprehensive plan of the sewer system now built and of its future extensions be prepared and submitted to the Commissioner of Health for approval."

These conditions, as were all of those in the permits, were accepted by the city, but the terms of the permits were not complied with in at least two respects, for on September first, one thousand nine hundred and six, plans for a sewage disposal plant had not been prepared or submitted to the State Department of Health for consideration. Furthermore, the Grant street sewer outlet into the Shenango River approved by the State Department under the express condition that said outlet be discontinued and the sewer connected with the city's main sewer outlet on or before January first, one thousand nine hundred and seven, had not been so connected on said date.

Therefore, permission to construct sewers as applied for on June fourth, one thousand nine hundred and six, was withheld by the Commissioner of Health. On November twenty-seventh one thousand nine hundred and six, councils authorized the city engineer to prepare plans for a sewage disposal plant.

In view of the fact that the intention of the city to comply with the stipulations of the State Department of Health had been manifest prior to January third, one thousand nine hundred and seven by reason of the employment of experts to prepare sewage disposal designs, and the passage of an ordinance for the extension of the Grant street sewer to the main sewer, and also in view of the fact that some of the sewers petitioned for are urgently needed as a matter of public health, on January third, the city asked that time for submitting plans for the sewage disposal plant be extended to April fifteenth, one thousand nine hundred and seven, and also that the time for connecting Grant street sewer with the main city sewer be extended to December first, one thousand nine hundred and seven.

It appears that the city of New Castle is furnished quite generally with sanitary sewers. The flow therefrom is conveyed to one point and discharged into the Shenango River in the Shenango River in the extreme southerly part of the corporate territory.

The Grant street sewer temporarily discharges into the Shenango River in the central part of the city. When this sewer is connected with the main intercepting sewer, the sewage of the city will be served by this main with the exceptions of that which is contributed by a fifty acre tract in the extreme southern part of the town.

Below the city the Beaver River, into which the Shenango River empties, is used as a source of filtered water supply for Beaver Falls, New Brighton and adjacent boroughs.

Above the city the Shenango River is used as a source of filtered water supply for New Castle itself. In the high standard of efficiency maintained by the water company at the filter plant, the public is protected, but to the extent

that some great emergency might arise necessitating the introduction of raw river water into the distributing system, this use of the river is a menace to New Castle's inhabitants.

To minimize this menace the Department has had a sanitary survey made of the Shenango River above the city of New Castle, and has taken action with respect to the extension of sewers in the borough of Greenville, Mercer county, and the borough of West Middlesex, Mercer county. Sewage disposal works are to be built at Greenville for the treatment and purification of all of the sewage of the borough. The plans have been approved and contracts for the construction thereof will be let during the coming season.

Permission to build sewers in the borough of West Middlesex will be given on condition that a sewage purification plant should also be built and that the sewage be treated at such works prior to its being discharged into the Shenango River.

The borough of New Wilmington is located on a tributary of the Neshannock Creek which comes down through New Castle. Plans for a sewerage system there have been approved by the State Department of Health on the condition that the sewage therefrom be first treated before being discharged into the waters of the State. It is the purpose of the Department to remove all of the menaces above the city of New Castle's water works intake as soon as practicable of accomplishment.

The present sewer system of New Castle was built to receive sewage only, but roof and some cellar water is discharged therein. The plans were prepared many years ago and the city has out-grown the limits of the territory intended to be served by the system as originally designed. The time has arrived when a comprehensive design for future extensions of the system should be made. The example which was set by New Castle in the early adoption of a comprehensive plan of sewerage may profitably be followed by other municipalities in the State. The necessity for a continuation of this policy will not need be emphasized. Doubtless it will be sufficient to call the attention of the city authorities to the economy of having the outlines of the proposed extensions, so far as the mains and sub-mains are concerned, made by some experienced engineer.

The proposed sewer extensions now applied for and exhibited on the plan accompanying the application comprises lateral sewers eight inches in diameter scattered all over the city in the several wards.

In view of the rapid growth of the city and the great demand for sewer extensions, and the injustice of making the property owners go to the expense of building masonry receptacles when permanent sewers can be constructed for less money, it has been unanimously agreed that the interests of public health demand that a permit be given the city of New Castle, and it is hereby and herein given to said city to make lateral sewer extensions to its existing sewer system under the following conditions and stipulations:

FIRST: That all roof and storm water shall be excluded from the sewer system, and that manholes of approved design shall be provided at all street intersections and changes in line and grade.

SECOND: That a plan of all existing sewers with profiles thereof, drawn to a satisfactory scale, shall be prepared and filed in the State Department of Health on or before July first, one thousand nine hundred and seven.

THIRD: At the close of each season's work a plan and profile of each sewer built during the year shall be prepared and filed with the Commissioner of Health, together with such other information in connection therewith as the State Department of Health may require.

FOURTH: This permit provides for the construction of lateral sewer extensions only. A plan for future main and sub-main sewers shall be outlined and submitted to the State Department of Health, together with the plans for works for the disposal of all of the sewage of the city, the latter of which shall be submitted to the Commissioner of Health for approval on or before the seventeenth day of April, one thousand nine hundred and seven.

FIFTH: The time in which the extension of the main trunk sewer to Grant street and its connection with said Grant street sewer shall be accomplished is hereby extended to not later than December first, one thousand nine hundred and seven.

SIXTH: This approval of the extension of the sewer system is given under the expressed stipulation that the plans approved shall convey all of the sewage of the city to one common point in the southerly part of the town from whence whenever sewage purification works are constructed therefor, all such sewage shall be subjected to treatment.

SEVENTH: If at any time the sewer system, or any part thereof shall have become a nuisance or menace to public health, such remedial measures shall be adopted by the city as the State Department of Health may advise, suggest or approve.

EIGHTH: No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

Harrisburg, Pa., April 12th, 1907.

NEW CASTLE, LAWRENCE COUNTY.

This application was made by the city of New Castle, Lawrence county, and is for an extension of time in which a plan of all existing sewers with profiles thereof, shall be prepared by the said city and filed in the State Department of Health.

A permit was issued to the said city of New Castle to extend its sewer system, which permit was dated April twelfth, one thousand nine hundred and seven, and among other things therein stipulated, was the condition that a plan of all existing sewers with profiles thereof, drawn to a satisfactory scale, shall be prepared and filed in the State Department of Health on or before July first, one thousand nine hundred and seven. This date is hereby extended to on or before November first, one thousand nine hundred and seven.

The city is also excused from that portion of the said permit of April twelfth, one thousand nine hundred and seven, whereby a manhole of approved design shall be constructed at every change in grade of the sewer. The city need not build a manhole at every change in grade, but if in the future, it should appear necessary that a manhole should be provided at a change in grade of a sewer where the omission is made, then such a manhole shall be provided at that time.

Harrisburg, Pa., May 23, 1907.

NEWPORT, PERRY COUNTY.

This application was made by the borough of Newport, Perry county, and is for permission to construct a sewer outlet into the Juniata River within the limits of the borough.

It appears that Newport is a borough of about nineteen hundred population located on the west bank of the Juniata River about twelve miles above its junction with the Susquehanna River. It is surrounded on the north, west and south sides by Oliver township and the southerly boundary is Little Buffalo Creek. The industries in the town and vicinity comprise a tannery, planing mill, furnace and foundry and tanning extract works besides others, which are located along the Pennsylvania Railroad tracks or in the vicinity of Little Buffalo Creek.

The town extends along the river for about one mile and back from it a less distance. About one-half of the area north and south along the river is flat but the western portion rises rapidly to the hills back of the borough. The square and business part of the municipality is in the flat district. Numerous small streams rising in the foothills come down through the borough to the river.

Recently the Pennsylvania Railroad built a four track road in the bed of the old canal which extends along the river front. This road is on an embankment about twenty feet high and culverts have been provided through it at all water courses.

There is a highway bridge across the river opposite the principal part of the town.

About a half a mile north of the borough there is a settlement known as Juniata Heights in the vicinity of which the Oak Extract Company has erected its plant.

The borough's public supply is obtained from springs on the hills opposite the town on the east bank of the Juniata River. The water is collected in a masonry reservoir and thence supplied to the town by gravity. There is also a pumping station on the banks of the river opposite the borough and just below the bridge by means of which the river water is introduced into the pipe system. Thus without any attempt at purification raw river water is supplied to the consumers. The works are owned by the Newport Home Water Company. The river supply is resorted to only during dry times or in emergency.

There are reported to be sixty wells scattered about in the borough and used as sources of drinking water by private individuals. Some of these wells are within fifteen or twenty feet of privy vaults and kitchen drainage. While the public supply taken from the mountain springs is considered by the consumers to be a pure supply, that taken from the river may be polluted and hence the people who use well water consider such a supply to be safer, than the public supply during the summer months when the river is used.

The northern part of the borough is drained by two small streams known as Fickes Run and Gantt Run. The former is near the boundary line and drains about one hundred acres of which twenty-five are within the borough limits. It passes down the side of Fickes avenue by an abandoned clay pit into which it overflows sometimes and thence under railroad culverts into the river opposite the foot of said avenue. Gantt Run is about one thousand feet south of Fickes Run and drains about five hundred acres of which thirty are within the borough. It passes through an abandoned clay pit and through culverts under the railroad to the river. The culverts are not low enough to

drain the pit, and because it receives the discharge of a fifteen inch private sewer in Gant avenue from houses said to be owned by George Fleisher and drainage from stables and privy overflows, in dry weather a nuisance exists there which is reported to be very offensive.

Dutch Gap Run drains about one hundred acres west of the town and empties into the twenty-four inch sewer at the borough line at Sixth street. The area drained is farming country.

Little Buffalo Creek drains about twenty-five square miles of which about fifty acres only are within the borough. Less than half a mile from its mouth there is a dam across the stream which furnishes power principally to the Newport Flouring Mill. Ice is also cut from the pond. About five hundred feet above the dam there is a new slaughter house and cattle pen which drains into the stream. Just above this is the settlement called Eberhartville and on a run coming down through it is located a slaughter house which drains to the stream. The mill, ice house and other places are all south of the creek in Oliver township. The village of East Newport is also south of the creek; it consists of a few houses and the works of the Juniata Furnace and Foundry Company. From here a twenty-four inch surface drain extends northerly to the Little Buffalo Creek which it enters below the dam. Connecting with this pipe is a six inch sewer receiving wastes from bottling works and one residence near the mill race. Over said mill race is located a slaughter house which is in a filthy condition.

Opposite the town, on the east bank of the river near the bridge and above the water works intake, there is a slaughter house draining to the stream.

The borough's sewer system was principally constructed in the year one thousand nine hundred. There are at present three and three-tenths miles of borough sewers and two-tenths miles of private sewers. The system takes both sewage and storm water.

There are four outlets to the system, two being into the river, both above the bridge, and hence above the water works intake and the other two into Little Buffalo Creek below the dam.

Passing up stream, the first creek outlet is at Second street. It is fifteen inches in diameter and serves a total length of two thousand feet of sewers, the smallest sewer being ten inches in diameter. The next public sewer outlet is at Fourth street, it is a ten inch combined sewer, length four hundred feet. Between these two sewers there is a private sewer twenty-four inches in diameter which receives surface drainage from East Newport. Just above Fourth street there is a six inch private sewer discharging into the creek. It is reported that these outlets do not create a local nuisance.

The first public sewer outlet into the river is forty-eight inches in diameter and empties into the stream just above the bridge. It serves eight thousand six hundred and fifty feet of sewers of which two hundred and fifty feet are six inches in diameter, nineteen hundred and fifty feet are ten inches in diameter, thirty-seven hundred and fifty feet are twelve inches in diameter and twenty-seven hundred feet are twenty-four inches in diameter. The district comprises the central and most thickly built up part of the town, also surface drainage from Dutch Gap Run.

The next public sewer outlet into the river is about three hundred feet up stream at the foot of Walnut street and is twenty-four inches in diameter. It serves the western part of the built up section of the borough and comprises a little over one mile of sewers of which two hundred feet are six inches in diameter, forty-three hundred and fifty feet are twelve inches in diameter and eleven hundred and fifty feet are twenty-four inches in diameter.

Still farther up stream, above Oliver street, there is a culvert three by one and a half feet under the railroad to the river which is used for drainage purposes and takes the waste from the Elk Tanning Company's plant. Below the bridge there are two forty-eight inch culverts for surface drainage and an eighteen inch private sewer at the Newport Planing Mills.

The streets paralleling the river are named in order from First street which is at the river front to Sixth street which is at the westerly boundary. Fourth, Fifth and Sixth streets are on the hillsides. In the lower part of the town, especially on Second street, considerable trouble is experienced from back water into cellars, and many house connections are put in with check valve to stop water during storms. The inlets from street gutters are reported to be trapped with possibly a few exceptions. The twenty-four inch outlet at Walnut street is of recent construction, having been put in in place of a twelve inch pipe to relieve the Second street sewer in time of flood. It is proposed to make similar connections from Second street to the river in Market and Mulberry streets for the purpose of abating the back water nuisance to a still further extent.

Some of the town sewers have flat grades and contain considerable deposit. It appears that the system was originally designed to be partly separate and partly combined and that afterwards it was changed to a combined system throughout. There are about four hundred houses in the borough of which about one-half are reported to be connected with the sewers. Privies are retained in the yards of many of the houses which are connected with the system.

The proposed sewers are to be laid in the extreme northern part of the borough, and the outlet eight inches in diameter, is to be into the river through the Pennsylvania Railroad culvert at Fickes avenue. There are about thirty houses in the neighborhood, all of which have privies, several of them have wells and there are a few small stables. The drainage from a part of these houses is now conducted by means of the fifteen inch private sewer, previously mentioned, into the abandoned clay pit. The proposed sewers are intended to do away with this nuisance. The fifteen inch sewer in Gantt avenue is to be intercepted and a six inch sewer built in Fifth street and also in Fourth street to connect with the proposed eight inch sewer main in or along Fickes avenue.

It is evident from the facts in the case that two of the borough's sewers constitute immediate menaces possibly to the town's water supply at times when it is drawn from the river, and, therefore, recourse to the river should not be had unless the water be first filtered before being used for domestic purposes. As the system is now operated, the river water is pumped directly into the street mains.

The municipalities on the river above Newport contribute sewage pollution, so that the river would be unsafe to use as a source of water supply even were Newport to take its sewage out of the stream.

Even were the source to be filtered, the interests of the public health would still demand that the borough's sewer outlets above the water works intake should be abandoned and the sewage from this part of the town be conveyed to some point farther down stream.

Marysville, Harrisburg and the Riverton Consolidated Water Company derive their source of supply from the river. These places are twenty and twenty-six miles respectively below Newport, and, therefore, the sewage from Newport constitutes a menace to the public supplies of these and other municipalities farther down stream using the Susquehanna River.

While it is desirable that the local nuisance at the abandoned clay pit in the northern part of Newport borough should be abated, and the district needs a sewer system, the petitioners have not shown wherein public necessity requires that more sewage should be permitted to be discharged by the borough into the Juniata River and especially above the water works intake, and, although the sewage from the district to some extent does finally get to the river, it appears that the public health so far as the borough interest is concerned, demands that the sewage should be diverted from the river above the water intake and be discharged at some point in such a way as to not jeopardize the lives of the water consumers. This interception should be done in conformity with a plan which should have for its object the improvement of the entire sewer system and the ultimate purification of all of the sewage of the borough.

It has been determined that the Newport Home Water Company should be notified that the use of the Juniata River water, without filtration, as a source of public water supply by said company is prejudicial to public health and that the said company be requested to abandon said supply or install adequate filtration works.

It has also been determined that the borough council be notified and it is herein and hereby notified that a hearing will be given on some fixed date relative to the application for sewer extensions, said hearing to be given for the purpose of advising the local authorities of the position which the Department takes with respect to the matter and for the purpose of assisting them to accomplish improved sewerage in the borough in a manner acceptable to all concerned.

It has also been determined that a permit be withheld and permission is hereby withheld for the creation of a new sewer outlet into the river above the water works intake, until such time as the borough shall have employed a competent engineer to devise an intercepting sewer and submitted a plan to the Department of Health for approval of the interception of all of the sewage of the borough and the ultimate treatment of such sewage. In conformity with this plan means may then be provided whereby the sewage of the northern part of the borough shall be conveyed below the water works intake and discharged into the river temporarily, if such temporary discharge shall appear to be necessary.

Harrisburg, Pa., June 10th, 1907.

NEWPORT, PERRY COUNTY.

This application was made by the borough of Newport and is for permission to construct its sewer system and to discharge sewage therefrom, untreated, into the Juniata River within the borough limits.

It appears that on October sixteenth nineteen hundred and six, the local authorities in Newport, applied for permission to construct a sewer outlet into the Juniata River, and after due consideration, the Commissioner of Health issued a decree dated June tenth nineteen hundred and seven withholding a permit for such sewer outlet in which decree was the following clause:

"It has also been unanimously agreed that the Commissioner of Health withhold a permit, and I do hereby and herein withhold a permit for the creation of a new sewer outlet into the river above the water works intake, until such time as the borough shall have employed a competent engineer to devise an intercepting sewer and submitted a plan to the Department of Health for approval for the interception of all of the sewage of the borough and the ultimate treatment of such sewage. In conformity with this plan means may then be provided whereby the sewage of the northern part of the borough shall be conveyed below the water works intake and discharge into the river temporarily, if such temporary discharge shall appear to be necessary."

In compliance with this decree the borough employed an engineer who prepared plans for improved sewage and sewage disposal works which were adopted by the borough council on October third nineteen hundred and seven and transmitted to the Commissioner of Health for approval with the above mentioned application. On October twenty-eighth, on behalf of the borough, two blue prints, one of the disposal plant and the other of the borough sewer system were substituted or plans submitted on October third. These latter plans were approved by council October fourteenth, so it is stated on the plans.

The present sewerage system was nearly all built in the year nineteen hundred, and largely on the combined plan, and has proved of much service. At a few points, where the sizes are inadequate to promptly remove the surface water during severe storm changes are demanded. It is the problem of disposition of the sewage other than into the river which calls for changes which would not otherwise be demanded.

A site for the disposal works in the extreme south eastern corner of the borough has been selected. The place is on the river front where the Little Buffalo Creek enters the Juniata and the sewage of the borough is to be conveyed to the disposal plant by gravity, by means of an intercepting sewer in Water street paralleling the river and extending up the valley the whole length of the borough to Fickes avenue. Beginning at the disposal works, the intercepting sewer is to be fifteen inches in diameter for eighteen hundred feet to Dock alley, thence it is to be twelve inches in diameter to Oliver street, this portion being an old sewer now emptying into the forty-eight inch Dock alley storm sewer. From Oliver street the intercepting sewer is to be ten inches in diameter to Fickes avenue, a distance of fourteen hundred feet. This part of the sewer will be shallow, but that portion of it south of Dock alley will be deep, fifteen feet or over in some places and its construction will be expensive.

All dry weather flow of the existing sewers which are small in diameter is to be intercepted by this sewer, and some of the storm from them. All future sewer extensions in the borough are to be on the separate plan and to discharge into the proposed intercepting sewer.

It appears that there are now three and thirty-five-hundredths miles of public sewers in the village of which the six inch pipe comprises twenty-one per cent., eight inch pipe twelve per cent, ten inch pipe twenty-two and five-tenths per cent., twelve inch pipe twenty-two and five-tenths per cent., twenty inch pipe two per cent., twenty-four inch pipe seventeen per cent. and forty-eight inch sewer three per cent.

It appears that with the exception of the entire length of sewer on Mulberry street, whose diameters vary from six to ten inches (which are altogether too small to be of material service in removing storm water) and also with the exception of a section of the Market street sewer from Third street through the Square northerly in Second street to Dock alley (which is gorged during moderate storms), the present system should be capable of removing the run-off resulting from a rain-fall of two and five-tenths inches per hour, a rate which is only exceeded by the heaviest downpours occurring at rare intervals, perhaps once in ten years.

The exception in Market street, being twenty-four inches in diameter, has a rated capacity of thirteen cubic feet per second. Owing to the territory tributary to its the capacity should be at least twenty-two feet per second and the proposed plan provides for a second twenty-four inch pipe here for storm water relief, discharging as does the present twenty-four inch pipe into the forty-eight inch Dock alley sewer at Second street which sewer in turn discharges into the river above Market street bridge at the foot of said alley.

It is proposed that the present sewer in Mulberry street be retained as a separate sewer, and that a new storm water sewer be constructed in this street (when funds are available) with a fifteen inch outlet into Little Buffalo Creek at the Second street bridge.

The present Mulberry street sewer discharges at this point. This pipe is to be continued as a storm sewer only and the said fifteen inch storm drain is to be a relief pipe. A separate sewer six inches in diameter is to be built in Second street and Fourth street south of Mulberry street and connected with the separate sewer in the latter street, and such changes are to be made in the connections of the catch basins with the existing sewers as will place these basins on the lines of the storm sewers. Therefore, the sewage from all buildings in the town on and south of Mulberry street will be received into separate

sewers discharging into the main water street intercepter, and the storm and roof water from this district will be collected in separate drains and thus conveyed to Little Buffalo creek.

All of the flow of Dutch Gap Run, a stream draining a farming territory of about one hundred acres west of the town, empties into a twenty-four inch sewer at the borough line at Sixth street and thence flows down the Dock alley sewer to the river. This storm water flow could not be economically delivered to the disposal plant, and there is no alternative but to parallel this structure by a separate sewer to receive house sewage only. It is proposed to connect the existing pipe sewers in the lateral streets for one block either side of Dock alley with the new separate sewer, and to connect up street gutter inlets by new connections to the storm sewer so that the lateral sewers will carry sewage and a limited amount of roof water and possibly some from one or two street catch basins.

It is estimated that calculations as to size of disposal plant based on a municipal population of three thousand is warranted by the growth of the borough in the past. Also that the future amount of sewage be provided for should be three hundred and forty thousand gallons per day, exclusive of whatever storm water may be admitted to the system.

Where one of the principal objects of the sewage disposal plant is to obviate a nuisance in a stream into which the sewage was formerly discharged, it may not be necessary to separate the sewage from storm water, in which case the entire flow in the combined sewers up to three times the dry weather flow may be treated at an average rate, and above this up to six times the dry weather flow may be treated at special rate. Only after the combined flow has reached this latter amount may the flow be permitted to be discharged untreated into the stream.

It is known that about ninety per cent. of the annual precipitation in this latitude occurs in storms in which the rate is one-twentieth of an inch per hour or less. The remaining ten per cent. of the annual precipitation is made up of storms and sharp showers in which the rate very materially exceeds the above. If the one-twentieth of an inch per hour precipitations were all collected from the combined sewers now in the town north of Mulberry street, approximately an area of sixty-six acres, the resulting run-off would be about seven hundred and fifty thousand gallons per day, which added to the maximum rate of flow of house sewage would require a plant capable of treating one and five-tenths million gallons per day as a maximum. For storms in excess of the said rate the water would pass by the present channels into the river without treatment.

As stated before, this plan would tend to obviate a nuisance in the river, but it would not prevent the pathogenic pollution thereof. A short local shower would carry the town sewage into the river in the summer when the stream was low, and this poison might easily reach a water works intake down stream in a few hours and thus menace public health. The necessity for such a menace does not appear. The cost of building a plant to handle the combined sewage and storm water would be considerably in excess of the amount required to build a plant to receive domestic sewage only and to construct additional sewers to convert the present combined system into a separate one.

Therefore, it is proposed in the territory north of Mulberry street and south of Oliver street where the combined sewers are now located, besides building a separate sewer in Dock alley, to also build a separate sewer in Market street and in Walnut street, whose diameters will range from six inches to ten inches; to connect the separate sewers with the main intercepter; and to change the catch basin inlets in these streets, connecting them with the drains to be used exclusively for storm water. Estates on the lines of these streets will be connected with the house sewer and the lateral sewers in streets running at right angles will also be connected to the separate sewer. Roof water, however, is to continue to be discharged into the lateral sewer in that case where it is now so discharged, and on these lateral sewers, there may be all told about a dozen catch basins which will continue to discharge street drainage into the sewer. It is expected that the total amount of roof and street water thus admitted will not be so considerable as to require overflow to the river. It may be possible to pass it through the disposal plant at considerably higher rates for short periods.

All future extensions to the system will be strictly on the separate plan.

The available area at the proposed disposal works is three-quarters of an acre which would seem to be sufficient for the amount of domestic sewage estimated. The design provides for a pump well, duplicate centrifugal pumps, septic tanks, in three units, sprinkling filters and settling basins for the filter effluent and a gravity discharge either to the creek, or when necessary to the pump well or the suction of one of the pumps for lifting to the flow line of the stream. Thus the layout permits the cutting out of any unit or shut down for repairs and cleaning.

A dyke is provided around the entire plant to protect it from floods. It is reported that there is only one record of a higher gauge height than elevation three hundred and eighty-one and three-tenths (this being three hundred and

eighty-eight and six-tenths) and hence the minimum elevation of the top of the dyke is placed at three hundred and eighty-four in the preliminary plan, this height may be increased when construction is undertaken. The dyke is to be constructed outside of the limits of the plant first called for to provide for future extension. Two septic tanks and two filter units may be first constructed and the remainder added as required.

The septic tanks are to be built of concrete, roofed over, eight feet deep to the flow line and they will afford storage of eight hours or more except possibly during short periods of heavy precipitation.

From the septic tank the sewage is to be distributed by gravity on to the sprinkling filters which are to consist of broken stone of from one-half to one and three-quarters inches in diameter, and five feet deep (the lower four inches or the filter being of larger size) all resting on the concrete bottom. The outside walls of the filters are to be of dry rubble masonry, and the dividing walls between the filters are to be of reinforced concrete.

The combined area of filters number one and number two is about one-tenth of an acre, and of filter number three about three-fourths as much.

The surface of the stone is to be two feet below the flow line in the septic tank and the septic liquid is to be discharged over the filters by means of small horizontal pipes laid in parallel rows eighteen inches apart.

The underdrains are to terminate in a valve chamber from which the effluent is to be admitted to either one of two settling basins designed to retain the effluent from one-half to two hours. The overflow from these basins is to go directly to the creek, when the river is below what is locally known as a nine foot stage, otherwise it will require to be re-pumped. This re-pumping will be necessary about fifteen days each year, so it is reported.

There are residences in the immediate vicinity of the proposed site and therefore a high-class maintenance of the work will be required. If the plan should be further removed from the built-up portion of the town, it might be placed across the Juniata River opposite the southeastern portion of the town. This would involve an additional expense.

The proposed design is tentative and submitted to show the general practicability of collecting the borough sewage at this point for treatment. The pump well and station could be located here to advantage. There are numerous questions in relation to details of the design which require further consideration before construction plans could be approved by the State Department.

The petitioners asked permission to build the intercepting sewer in Water street from Oliver street, seven hundred feet northerly, thence across private property under the Pennsylvania Railroad enbankment to Third street and thence in Third street north and south to Carolina avenue and Fickes avenue, west in said avenues also west in Gantt avenue, also in Fourth street northerly from alley east of Carolina avenue and also in Fifth street, all to be separate sewers having diameters ranging from six inches to ten inches, the outlet thereof to be into the existing sewer in Water street at the foot of Oliver.

It is represented that the finances of the borough will not permit of more work at this time. The above mentioned sewers are demanded for reasons previously set forth in the said decree of the Commissioner of Health.

Thus it is seen that the sewage from the borough will continue to be discharged into the river through the existing outlets above the Market street bridge and hence above the water works intake. However, it has been ascertained that the cost of moving the present main outfall at the foot of Dock alley to below Market street would not be less than five thousand dollars, while the cost of extending the water pipe up stream would not be over one-fifth of this amount. The water company having been notified by the State to abandon the use of the intake unless the water be filtered would not care probably to assume this expense. It would appear to be a matter for adjustment between the officials of the municipal corporation and the water company.

Sewerage facilities are demanded in the interests of public health in the north end of the town. The interests of the public health also demand that the river water should not be used for public supply in Newport, even if the water be filtered, so long as the borough sewers empty into the stream above the intake, and therefore, one of two things should be done. Either the water company should enter into a contract or binding agreement with the borough not to use river water from the present intake, or the borough should extend or cause to be extended said intake up stream above the existing sewer outlets or carry said sewer outlets down stream below the intake.

Permission to discharge the sewage into the river from the existing sewers may continue but not indefinitely, since the interests of the public health require the discontinuance of such discharge into the waters of the State at as early a date as may be found to be practicable. The borough authorities, therefore, should keep this constantly in mind and from time to time make those improvements and changes and extensions contemplated by the plans now under consideration.

It has been determined that the interests of the public health require that a permit be issued and it is hereby and herein issued for the construction of

the proposed sewers and approval given for the proposed comprehensive sewerage system and sewage disposal works under the following conditions and stipulations:

First: That all extensions to existing sewers shall be on the separate plan, and that the elimination of the combined sewers from the comprehensive system herein approved shall be brought about from time to time as the money may be available therefor and at the close of each season's work plans of the sewers and drains laid during the year shall be prepared and filed in the office of the Commissioner of Health together with any other information in relation thereto which may be desired.

Second: Permission to discharge sewage into the waters of the State shall cease on July first, nineteen hundred and ten; but if at that date the interests of the public Health demand it, the Commissioner of Health may extend the time.

Third: On or before July first, nineteeen hundred and ten, the borough of Newport shall prepare detail plans for works for the purification of the borough sewage and submit them to the Commissioner of Health for approval. If for any reason it is not practicable or necessary for the construction of such works at that date, then the Commissioner of Health, after having considered the matter may approve such plans or modify or amend them and fix the date when they should be constructed, having in mind the general policy of the State with respect to the treatment of municipal sewage at other places in the Susquehanna River watershed.

Fourth: The borough authorities should have in mind the possible future necessity, when sewage disposal works shall have been built, of the cutting out of roof water from the system, and this should govern such rules and regulations as the borough council may deem it necessary to make relative to new house connections with existing sewers. All roof and storm water shall be excluded from sewer extensions.

Fifth: No pathological material from any laboratory shall be discharged into the sewer, the proper authorities shall cause these wastes to be destroyed on the premises.

Sixth: It is expressly stipulated that some arrangement must be made to prevent the further pollution of the river water by borough sewage at any point above the present water works intake unless said intake be entirely abandoned or changed; and, therefore, the permission herein granted to discharge sewage into the Juniata River above the said water works intake where it now exists is given under the condition that the said intake shall be entirely abandoned, or that the proposed Water street intercepting sewer shall be carried down stream below the Market street bridge and discharged at a point in the river below said water works intake.

Harrisburg, Pa., November 9th, 1907.

NEW OXFORD, ADAMS COUNTY, NEW OXFORD DRAINAGE COMPANY.

This application was made by the New Oxford Drainage Company, and it is for permisison to build a system of sewerage and sewage disposal works, and to discharge the effluent from said works into Oxford Run, within the limits of the borough.

It appears that the borough of New Oxford is located in Oxford township, Adams county, on the Baltimore and Harrisburg Division of the Western Maryland Railroad, about nine miles east of Gettysburg. The town has a population of about nine hundred and is the trading point for the farmers who live in the surrounding territory. Possibly two hundred of the citizens are employed in the shoe factories which are in a flourishing condition and assure a steady normal growth to the municipality.

The natural drainage facilities are good. The borough is situated at the summit of a gradual eminence which commands a view of the surrounding rolling country. Most of the borough, as now developed, is north of the railroad and this part is drained by Oxford Run which flows northwesterly a distance of over one-half mile to the Little Conewango Creek, entering it at a point just below Diehl's mill dam, north of the railroad. The other part of the borough slopes southerly to the Little Conewango, whose head waters are in Maryland and come down from the south, flowing in a generally northerly course through an undulating agricultural country under high cultivation.

The borough owns its own system of public water works. The supply is drawn from the Little Conewango, in the pool formed by Diehls' dam and about one-half mile up stream therefrom and after being passed through a small coke and sand strainer is raised by means of a gasoline engine through a rising main five thousand three hundred and fifty-seven feet long to an iron stand pipe, sixteen feet in diameter and eighty feet high. In the summer time, when the creek is low, the strainer will not pass a sufficient quantity of water to supply the pump, and so raw water is drawn directly from the creek. This stream receives sewage pollution from the borough of McSherrystown, which

is six miles distant, and from Hanover borough, which is two miles further on. There is a dam across the creek between the New Oxford water works intake and the point where McSherrystown sewage enters the stream.

The works are designed to afford fire protection as well as a domestic supply. The average daily consumption is reported to be forty-five thousand gallons. The principal users are the hotels and shoe factories. Upwards of half of the population use the public supply in their dwellings, but still rely on dug or drilled wells for drinking water. There are said to be about one hundred and fifty of these private wells in the borough. The underlying rock is red shale and it is generally from three to seven feet below the surface of the ground. Consequently, the level of the water in the ground is not far below the surface and in wet weather cellars are liable to be damp or flooded.

These conditions preclude successful disposal of sewage in percolating cesspools. Therefore, the customary surface privy prevails. A few of the citizens only have gone to the expense of building drains for the removal of storm water and sewage. There are four such sewers in the borough. They all empty into Oxford Run.

Two of them empty into the run just west of Carlisle street. One is the Gilbert and Miller sewer and the other is owned by H. W. Swartz and others. There are said to be eleven houses conected with this latter pipe. Both are six inches in diameter and drain cellars as well as water closets.

There is a small sewer pipe in Bolton street extending from the hotel on Philadelphia street northerly to the run. There is also a small sewer pipe in North Orange street extending from Philadelphia street northerly to the run.

There is a sewer owned by George Sundy, proprietor of Hotel Eagle, (which sewer is now taken over by the drainage company) which formerly extended from the said hotel in the public square northerly in Carlisle street and westerly in East Berlin street to Oxford Run. Now this sewer has been extended by the New Oxford Drainage Company down the valley of Oxford Run fifteen hundred feet or more where it temporarily discharges into the run.

On a private property in the central part of the borough near Myers stable there is a cess-pool which overflows across other property to the railroad location in the gutter of which it flows northerly and finally reaches Oxford Run.

The New Oxford Drainage Company was incorporated in one thousand nine hundred and three for the purpose of constructing and maintaining sewers for surface and sewage drainage for the sanitary improvement of the borough of New Oxford.

Said company purposes to construct a system of sanitary sewers for the whole of the municipal territory tributary to Oxford Run, to eliminate roof and storm water from the system but to admit cellar water and sewage, and to treat the flow from said system by the septic tank and contact filter process. The plans of the sewers are now being prepared. Details of the purification works have already been submitted.

The septic tank is to be built of brick masonry with a re-inforced concrete roof, is to be twelve feet wide and twenty-two feet long and to have a depth to the flow line of six feet. Its capacity, therefore, will be about twelve thousand gallons. In the inlet corner of the tank is to be a masonry chamber four feet square with an opening in one of its sides two feet square six inches from the bottom of the tank. This chamber is to serve the purpose of a grit basin. Sewage is to be admitted to it through a twelve inch pipe laid through the wall six feet above the bottom of the tank. On the outside of the tank at the inlet pipe is a small chamber shallow and three feet square in which the twelve inch outfall sewer from the town is to terminate at an elevation of four inches above the bottom. In the bottom of this small chamber is to be an eight inch vertical by-pass fitted with a cap, so that when the tap is removed the sewage instead of flowing from the twelve inch pipe into the septic tank will flow down the eight inch vertical pipe and be by-passed to the run.

Across the outlet end of the septic tank is to be a wooden box twelve inches square and twelve feet long provided with openings in the bottom and the whole submerged to about mid-depth of the tank to serve as a non-disturbing, collecting conduit for the septic tank effluent and delivering it to a vertical eight inch pipe terminating in a quarter bend, out of which outlet at the top, six feet from the bottom of the tank, the effluent from the septic tank will be discharged into a channel connecting with the contact filter bed.

It is not anticipated that the daily discharge of sewage and cellar water will exceed twenty-five thousand gallons for several years. At this rate the displacement in the septic tank will be about once every twelve hours.

Adjacent to the septic tank is the contact filter bed twenty feet wide and forty feet long and two feet deep. It is to be built of brick masonry on the bottom and sides. The bedding material is to be broken stone. The septic tank effluent is to be delivered onto the bed in one corner of the filter and is to pass laterally through the spaces between the pieces of broken stone until the entire tank is filled with septic effluent to a depth of two feet when the contents will be drained automatically to the run. This automatic emptying of the bed when it is full is to be accomplished by a syphon to be placed outside of the filter bed at the opposite corner from the inlet thereof. A pipe or opening twelve

inches square is to connect the bottom of the filter bed with the bottom of the syphon chamber. As the septic effluent rises in the contact filter it will rise in the syphon chamber also, the syphon being set to begin operation as soon as the depth of liquid has reached two feet.

The plant is to be located on land now owned by the Drainage Company and purchased for the purpose. The tract borders the run, and the sewage will be delivered to it by gravity. The topography is such that there is very little vertical height on the land between the elevation of the outfall sewer and the run. This is why the area is not adapted to a filter bed deeper than the one proposed. Were the outfall sewer extended down stream a quartr of a mile more or less it would be possible to deliver the town sewage by gravity at an elevation sufficiently above the run to admit of the installation of sewage disposal works in which ample vertical height would be secured. This of course, would require the purchase of more land and the laying of more sewer pipe.

It is reported that Mr. W. A. Diehl who owns the farm land through which Oxford Run extends below the borough, instituted suits sometime since against H. W. Swartz et al and against George Sundy for damages arising from the sewage pollution of Oxford Run. It appears that the proposed sewage disposal works will obviate the pollution of the run from the Sundy sewer and it may obviate the pollution from the other private sewers provided the owners thereof negotiate with the New Oxford Drainage Company for the privilege of discharging sewage into the company's sewer system. Justice would not be attained by requiring the treatment and purification of sewage from a part of the sewers in the borough. Therefore, in all instances, if in any, the discharge of sewage into natural water courses within the borough should cease.

The Little Conewango joins the Big Conewango Creek a short distance down stream below Diehl's Mill. The main stream flows in a general northeasterly direction through Adams and York counties draining an agricultural territory under high cultivation upon which no municipalities of any size exist and enters the Susquehanna River at York Haven. The creek is not known to be contaminated to any marked degree, and, therefore, the preservation of the purity of its waters, requires watchfulness only on the part of the State authorities to the end that the discharge of sewage therein shall be prevented. The petitioners do not claim that public necessity requires that the sewage of New Oxford borough be emptied into Oxford Run. To the contrary, sewage purification works are proposed to prevent such pollution. Nevertheless, the construction of the plans offered for acceptance, would inevitably result in a positive contamination of the stream. The pathogenic nature of the effluent from the proposed plant might be as great as would be the case were crude sewage to be discharged from the sewers into the run without an attempt at purification.

The proposed contact beds with a depth of two feet only would afford no opportunity for efficient nitrification. But one bed is propsed, and, therefore, sewage would constantly flow into it; hence, it would be a continuous instead of intermittent filter. Continuous operation of a contact bed renders its operation that of a strainer and such a device is never provided except as an intermediate process in works where purification is aimed at. Some means for further purification of the effluent from the proposed strainer is necessary.

Still further, the by-pass provided at the entrance to the septic tank whereby crude sewage may be delivered to the run is ill-advised and a menace. This pipe should terminate in the strainer or at that part of the works where the final purification of the sewage should be accomplished.

The grit chamber should be provided outside of the septic tank, not in it, as now proposed.

Any apparatus for the disposal of sewage is liable to get out of order and where the works are not of sufficient magnitude to demand the presence of a caretaker, the prime requisite is such a design and construction as will assure good results under the minimum of attention. A septic tank works continuously and does not require much attention. The nitrification of the organic matters in the septic effluent can be best secured with least attention by an intermittent sand filter. Such a filter having a surface area of about one quarter acre and a depth of not less than three and one-half feet of sand of suitable quality, properly underdrained would, if neglected to quite an extent, be most likely to satisfactorily purify a septic effluent up to twenty-five thousand gallons daily. The sewage should be distributed in uniform doses over the entire surface of the filter bed, and this distribution could be effected automatically by a syphon to be placed in a chamber at the outlet of the septic tank and between the tank and the filter bed.

It has been unanimously agreed that the interests of the public health demand that a permit be granted and it is hereby and herein granted to the New Oxford Drainage Company to install a system of sewerage and sewage disposal works for the borough of New Oxford under the following conditions and stipulations:

First. That before any sewers are built and used, a plan of the entire borough showing the boundaries thereof and the highways and alleys and the sewers

therein which are now laid or may be laid in the future by the said drainage company or that may be incorporated in said company's system, be prepared and submitted to the Commissioner of Health for his approval.

Second. That all roof and storm water shall be excluded from the sewers, and that at the close of each season's work plans and profiles of the sewers as built shall be prepared and filed with the State Department of Health, together with such other information as the Commissioner of Health may require relative thereto.

Third. No sewage whatsoever shall be discharged from said sewer system into any stream either directly or indirectly, but it shall be delivered to and purified at the works to be constructed for this purpose.

Fourth. Before said sewer system or any part thereof is used by the New Oxford Drainage Company, sewage purification works shall be built according to plans to be submitted to and approved by the Commissioner of Health. By way of suggestion, it is offered that among other plans that may be devised, works comprising a septic tank of twelve thousand gallons capacity laid out to admit of the economical addition of other units in the future and an intermittent sand filter depth not less than three and one-half feet and surface area of one quarter of an acre, laid out to admit of future extension would, other things being satisfactory, meet with the approval of the State Department of Health.

Fifth. No pathological material from any laboratory shall be permitted to discharge into the system. The proper authorities shall cause these wastes to be incinerated on the premises.

Sixth. If at any time, in the opinion of the Commissioner of Health the sewerage system, or any part thereof, is injurious to public health, then such remedial measures shall be adopted as the Commissioner of Health may advise, suggest or approve.

Harrisburg, Pa., April 12th, 1907.

OAKMONT, ALLEGHENY COUNTY.

This application was made by the borough of Oakmont, Allegheny county, and is for permission to extend its sewer system and to discharge its sewage through existing sewers into the Allegheny River.

It appears that the borough of Oakmont, an almost exclusively resident community, is situated on the east bank of the Allegheny River about eleven miles above the city of Pittsburg on the Allegheny Division of the Pennsylvania Railroad system and a little over twelve miles above the confluence of the Allegheny and the Monongahela Rivers.

The incorporated territory is very favorably located on a long incline sloping westward to the river and southerly to Plum Creek, which creek forms the southerly boundary of the borough separating it from Verona. The town stretches along the river for one and three-quarters miles. The shores bowing outward form a crescent so that the currents are reported to be greater on the opposite and along the west bank of the river by Oakmont. The northern boundary is a small stream known as Falling Springs Run, this part of the borough back from the river being well wooded and unoccupied. The easterly boundary is Plum township and the land in the township contiguous to the borough continues to ascend gradually to the table lands above. The natural drainage facilities and proximity of the site to Pittsburg has attracted many well-to-do men whose avocations call them to Pittsburg during business hours, but whose means enable them to command first class suburban residences and a majority of the dwellings in Oakmont have been built and are occupied by this class of citizens. On the medium sized lots in the town houses of a moderate cost have been erected. Even the homes of the less resourceful and mechanics employed in the manufactories present a neat appearance, with few exceptions. The streets are generally well paved and broad, side-walks have been permanently constructed, shade trees are numerous and all told the borough presents an attractiveness and tone which vouchsafes to it a continued growth as a residential suburb of Pittsburg and reflects credit to those in local authority. The railroad is back from the river over one-quarter of a mile through the central part of the borough, but it approximates the river bank at the north end and above follows along said bank.

The only land in the town which is ever reached by high freshet is a small tract between the railroad and the river in the southern part, principally in the vicinity of Plum Creek. No permanent use is made of this land.

The highways which extend back from the river up the slope are designated as "A," "B," "C" streets, and so forth, with the exception that Plum street is in the valley of Plum Creek and College avenue is the next one north of it. Then follows "A" street and "I" street is the last one. At right angles to these highways and hence substantially parallel to the river course, the streets are designated from First street, which is near the river, to Twelfth street, which is near the easterly line. Railroad avenue is adjacent to the railroad towards the river and Oakmont avenue is adjacent to the railroad towards the hillside. Both of these main highways extend lengthwise through the town.

Surface drainage from the hills is maintained principally in the street gutters or in the natural valleys, of which there are several coming towards the river. But the water is conducted largely, if not wholly, under ground to the river from the railroad or near it by means of sewers.

The present population is estimated to be thirty-three hundred; in the year nineteen hundred, it was twenty-three hundred and twenty-three, and in the year eighteen hundred and ninety, immediately subsequent to the incorporation of the borough out of what was formerly Verona borough, the population was sixteen hundred and seventy-eight.

There are three industrial plants in the town. One is the Verona Tool Works, employing about one hundred and fifty men and located up the valley at Plum Creek several hundred feet west of the railroad. Another is the plant of William B. Scaife and Sons, Structural Iron Manufacturers, employing between three hundred and fifty and four hundred hands and located on the bank of the river in the central part of the town, between Ann and "C" streets. The third is the works of the Crescent Forging Company, employing about sixty hands and located on the banks of the river in the extreme northern part of the borough.

There are at present four public sewer outlets in the town, one of them being into Plum Creek and the other three into the river.

The Plum Creek outlet is thirty inches in diameter and serves a total length of about twelve thousand six hundred feet, the sizes ranging from eight to eighteen inches in diameter and the sewers being used for house drainage only. It is reported that roof water is excluded from the sewers. This district comprises the land naturally drained towards Plum Creek. The sewage from the Verona Tool Works and other wastes are said to be taken into the district system.

The first river outlet of the public system up stream from Plum Creek, is at the foot of "B" street. It is thirty inches in diameter for a distance of seventeen hundred feet to Oakmont avenue, then twenty inches in diameter six hundred feet to Fourth street and then eighteen inches in diameter for three hundred and fifty feet to Fifth street. This line of sewer receives surface drainage as well as domestic sewage from the sanitary laterals which discharge into it. They comprise all told a total length of about eighteen thousand seven hundred and fifty feet, sizes ranging in diameter from eight to eighteen inches. It is reported that these laterals are used strictly as sanitary sewers and that surface and roof water is excluded therefrom.

The next public sewer outlet into the river up stream is a ten inch pipe at the foot of Ann street. The total length of this line is eight hundred feet.

The next public sewer outlet into the river is at the foot of "E" street and it is a combined sewer. The pipe is twenty-four inches in diameter for a distance of sixteen hundred feet to Oakmont avenue, thence to Fourth street, a distance of six hundred feet, it is fifteen inches in diameter, where the pipe first receives surface water. However, there is a branch north in Oakmont avenue, fourteen hundred feet long and fifteen inches in diameter which receives surface drainage, so it is reported. The exact extent and amount of the street drainage is not known by the Department. Connected with these storm sewers there are lateral sanitary sewers comprising all told a length of about nineteen thousand six hundred feet, sizes ranging from eight to eighteen inches in diameter.

So it appears that there are nine and eight-tenths miles of sanitary sewers and one and two-tenths miles of combined sewers in the borough.

The general sanitary conditions in the borough appear to be good. There are very few cesspools or privies and it is reported that none of these are in the streets where a sewer is laid. Out of the total population of thirty-three hundred, the local authorities report that three thousand people reside in dwellings connected with the public sewer system.

At the Scaife plant there are two drains into the river. One of them receives sewage from the office building. Here there is also an outside privy, for the use of employes, which overhangs the river bank. Just north of Ann street are tenant houses belonging to this corporation from which a sewer for kitchen drainage extends to the river. The outside privies are reported not to be a source of pollution to the river.

Above "H" street there is a private sewer to the river from the residence of L. M. Morris.

There is a twelve inch sewer to the river from the Crescent Works. With it are connected six closets, according to reports.

The public water supply is obtained from the Allegheny River and is furnished by the Suburban Water Company of Allegheny county, a corporation duly chartered under the laws of the State in the year eighteen hundred and eighty-seven, for the purpose of supplying water to the public in the district composed of what was then the borough of Verona and territory adjacent thereto. This company leases and operates the systems of the Moore Water Company of Plum township and the Unity Water Company of Penn township, these two companies having been chartered in the year nineteen hundred to supply water to the public in their respective townships. The State Department of Health

has not received a report and plans of the systems of the two latter companies, but the Suburban Water Company has rendered a partial report and general plans of its system in Verona and Oakmont boroughs.

It appears that the river water is drawn through filter cribs imbedded in the channel of the river and located just above Oakmont in Plum township, and that it is raised by pumps through the distributing main system of the boroughs, the overflow being into a reservoir located on the hill in Penn township back of Verona. From this reservoir the water is supplied to the pipe system of the Unity and Moore Water Companies, the territory supplied in the townships being that contiguous to the pipe line from said reservoir to the Union Railroad yards of the Bessemer and Lake Erie Railroad at Unity Station on Plum Creek about four and one-half miles above Verona. There are forty-two dwellings supplied in the townships; in Verona, five hundred and twenty, and in Oakmont, five hundred and sixty-five. The pumping station, reservoir and street mains were built in the year eighteen hundred and ninety-three. During the year nineteen hundred and five, the Suburban Water Company installed a new pump and added a filter crib to the system. This was done to meet the increased demands for consumption after a notification to the State Department of Health that the additions were contemplated and asking advice as to formalities necessary for a State permit. No permit for this work was issued, but the additions were made.

Practically all the built up part of Oakmont is supplied with public water. There are nine and seven-tenths miles of service mains. Prior to the installation of the public system private wells and springs were in use and typhoid fever was in evidence. It is reported that on the substitution of these private sources by the public supply, the disease nearly disappeared for a while.

An adverse report of importance relative to the quality of the public supply was rendered on November twenty-eighth, one thousand nine hundred and five, by F. T. Aschman, analytical chemist of Pittsburg, who reported that the water was contaminated with sewage and should be condemned. This report in conjunction with the presence of considerable typhoid fever and acute bowel trouble caused the local Board of Health to warn the citizens to boil the water.

It appears that for the year nineteen hundred and four nine cases of typhoid fever were reported and for the year nineteen hundred and five twenty-six cases were reported. Tests of samples of the raw river water and the water after it had been filtered through the crib made by Chapin and Knowles during December, nineteen hundred and five, showed the water to be good. The crib removed the greater percentage of the mud sediment and also bacteria from the water passing through the filter.

During the year nineteen hundred and six, eighty-eight cases of typhoid fever were reported in the borough and the local Board of Health reached the conclusion that the cribs were not adequate filters. So the public was warned to boil the water.

Tests made by F. V. Woolridge of Pittsburg, of samples collected on April twelfth, seventeenth and twenty-sixth, nineteen hundred and six, showed the filter crib to be in good working order and accomplishing about ninety-nine per cent. efficiency. At that time colon were present in the river water, but none were found in the filtered supply. However, in July this analyst found colon present in the filtered water and pronounced it non-potable, and in August and also in September, on tests, the filtered water proved to be increasing in pollution and unfit for domestic purposes without boiling. In December examinations by the Philadelphia Clinical Laboratory showed similar results.

While tests of milk proved it to be doubtful, the continued and general distribution of the typhoid cases over the town indicated that its source was public water supply.

Prior to the September term of the public schools, the school board on advice of the Oakmont Board of Health installed a filter plant in the basement of the main building.

Tests of well and spring water in the town with few exceptions showed surface contamination. People were generally cautioned about drinking unboiled water. For the first six months in the year nineteen hundred and seven, twenty-nine cases have been reported, corresponding months in the year nineteen hundred and six totalling seven cases less.

There were eight cases reported in Verona for nineteen hundred and six. Evidently, therefore, physicians were delinquent about reporting cases in that place.

The local Board of Health has requested the assistance of the State Department of Health in solving the vexatious problem of how to stamp out the typhoid disease from the community. The surest way would be to discontinue the use of all wells and springs in the borough, and to abandon the Allegheny River as a source of supply because it contains pathogenic poison. This pollution is discharged into the river all along its course above Oakmont. A great source of infection exists in the Tarentum district, where typhoid fever is practically endemic. This place is eight and one-half miles above Oakmont's water works intake, so that the sewage organisms discharged into the river

at Tarentum through that borough's sewers, within two or three hours may pass over and possibly through Oakmont's filter crib and be introduced into the homes of the citizens of Oakmont. There is no way provided to regulate the filter crib. If it gets out of order or be imperfectly purifying the river water, as is known to have been the case on various occasions, there is no way of manipulation provided to increase the efficiency. Only by the most modern and approved filter apparatus, provided with means of regulation and control, can badly sewage-polluted waters, such as the Allegheny River, be rendered constantly safe and wholesome for domestic uses. And even then there is danger that in case of break-down or accident the poisoned source may be temporarily or accidentally supplied to the people. Hence as a public health precaution it is demanded that sewage should cease to be discharged into the Allegheny River above those points from which the water is drawn as a source of public supply.

The borough asks permission to extend the sewer system according to the comprehensive plan adopted prior to the law of nineteen hundred and five, under which the existing sewers have been built. The extensions will be made from time to time as necessity may require. For the immediate present three-eight inch lateral sanitary sewers, totalling twenty-two hundred feet only, are contemplated. These are required to keep pace with the development of the town in their respective blocks. On Second street there is to be a three hundred and fifty foot extension between "A" and "B" streets, to which two connections will be made at once; on Ninth street, between "D" and "E" streets an eight hundred foot extension, to which five connections may be made; and on Tenth street between "E" and "H" streets a ten hundred and fifty foot extension, to which eight or ten dwellings may be connected during the first year, and there will probably be more in the future. According to reports, certain building operations are being postponed pending the laying of these proposed sewers.

The case of the petitioners is one in which the point to be decided relates not so much to the necessity of the discontinuance of the discharge of the borough's sewage into the river, which necessity is paramount and must be brought about at the earliest practicable moment, as to whether the interests of public health will be subserved by permitting the petty lateral extensions immediately contemplated. The few houses to be connected with the extensions will not contribute a measurable increase to the menace of the down stream water supplies. The borough's sewers are now about one mile and a half above the Allegheny city water works intake, three and three-eighths miles above the pumping station of the Pennsylvania Water Company and about five miles above the city of Pittsburg's intake. If permission be denied the borough, a material hardship will be imposed upon private individuals and upon the borough in general. And this cannot aid in hastening the adoption of sewage purification works for the entire sewage of the borough. Were the State to demand the preparation of plans and the construction of a municipal sewage plant at an early date, and at the same time permit the proposed sewers to be laid, possibly the good accomplished by thus aiding the establishment of modern sanitary facilities might entirely over-balance any possible harm which the small amount of added sewage to the borough's system might do. But it is not necessary that general sewerage extensions should be made in the borough and the sewage therefrom discharged into the Allegheny River.

The assessed valuation of Oakmont is reported to be three million seven hundred and thirty-five thousand dollars, which admits of a debt of about two hundred and sixty thousand dollars. Since the present debt is one hundred and two thousand dollars only, if the figures are correct, the municipality can borrow one hundred and sixty thousand dollars. The cost of collection of the borough's sewage and the erection of disposal works for the purification of the sewage would be so much less than this sum as to render the project entirely within the means of the borough.

Since it is not economical, but is in fact prohibitive in cost, for a town of Oakmont's size to attempt to treat mingled sewage and storm water, this fact dictates that there should be a separation of house drainage and storm water. Separate conduits should be provided. Since but a small portion of the existing sewers in the borough are combined, the expense of this separation would be moderate. It is reported that a storm drain is to be laid in Railroad avenue. If this be so, it will be prudent for the local authorities to consider the advisability of making this a part of the purely surface drainage system of the borough, and to exclude all house drainage of a sewage character from storm water structures.

The site of the disposal works needs to be carefully considered. Preferably a secluded spot should be selected in a locality not likely to be in demand for development purposes. There is a possibility that the intercepting system and disposal problem might be considered jointly by the boroughs of Oakmont and Verona, to their mutual advantage.

It has been determined that the interests of the public health demand that a permit be granted, and it is herein and hereby granted, to the borough to extend its sewer system as proposed, under the following conditions and stipulations:

First. That all storm water shall be excluded from the sewers and that at the close of each season's work plans of the sewers laid during the year, together with any other information required by the Commissioner of Health in relation thereto, shall be filed in the State Department of Health.

Second. If at any time, in the opinion of the Commissioner of Health, the sewer system or any part thereof is a nuisance or prejudicial to the public health, then the borough authorities shall adopt such remedial measures as the Commissioner of Health may advise or approve.

Third. No pathological material from any laboratory shall be discharged into the public sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

Fourth. This permit is issued under the express stipulation that on or before January first, one thousand nine hundred and eight, the borough shall prepare plans for the separation of drains for the removal of storm water, from conduits for the removal of sewage and for the collection in a strictly sanitary system of all of the sewage of the borough and its conveyance to and treatment in a sewage purification plant. These plans, together with a plan and report on such sewage disposal works, shall be submitted on or before said date to the Commissioner of Health for approval. When approved, modified or amended, the said Commissioner will fix a time when such works shall be built and permission to discharge sewage temporarily into the Allegheny River from the borough sewers will expire at such time.

The borough authorities are informed that the Department is notifying the owners of private sewers now discharging into the river within the borough limits, and the owners of privies located on the banks of the stream that the discharge of all sewage into the waters of the State must cease. Where possible or practicable the sewage from every property should be contributed to the public sewer system. The local Board of Health should be commended for its activity and efficient work. The injunction to boil water should be reiterated from time to time. The Department of Health will co-operate with the water company in the effort to render the public supply pure and wholesome. All wells and springs in the borough should be ordered abandoned if tests to be made frequently prove the waters thereof to be polluted.

Harrisburg, Pa., August 14th, 1907.

CLAREMONT, O'HARA TOWNSHIP, ALLEGHENY COUNTY. ALLEGHENY COUNTY WORK HOUSE.

This application was made by the board of directors of the Allegheny County Work House and is for approval of plans for the treatment of the sewage of said institution located at Claremont Station, O'Hara township, Allegheny county.

It appears that the Allegheny County Work House is a penal institution, capable of housing one thousand inmates and officers. Its capacity will be increased in the near future to fifteen hundred. The buildings are located on the north bank of the Allegheny River, back therefrom about twelve hundred feet, and elevated approximately about seventy feet above low water and fifty feet above the bank. Between the buildings and the river are the tracks of the West Penn Division of the Pennsylvania Railroad system, and between the tracks and the river there is a level or a gently sloping plateau which is utilized for the cultivation of garden truck. The drinking water for the institution is derived from springs on the hills elevated about one hundred and fifty feet above the buildings, or sufficiently to supply the institution by gravity. Water for power, industrial and other uses is taken for the Allegheny River and raised by means of steam engines to a reservoir on the hill located on the grounds belonging to the institution. The pumping station and intake are located in the upper end of the property and about three hundred feet above the outlet into the river of the present combined sewer.

The dry pail system for the collection of excrement is in use in all of the cells of both wards. Twice daily the contents of the pails are dumped into a hopper from whence the material is flushed by one and one quarter inch streams into a sewer. This flushing accounts for the high maximum output of sewage which is daily about two hundred thousand gallons.

The officers' quarters are provided with modern plumbing facilities and the sewage therefrom goes directly into the sewer. This conduit ranges in diameter from twenty inches to thirty inches and serves for the removal of storm water and the manufacturing wastes, together with the sewage from the institution.

The proposed plan contemplates the installation of a separate system of sewers for the removal of domestic sewage and manufacturing wastes exclusively. The existing sewers will be continued as conduits for the removal of storm and roof water only. Flush tanks will be provided for the flushing of the excrement hoppers in place of the present method of continuous water jets.

On January tenth, one thousand nine hundred and six, the attention of the board of directors of the institution was called to the fact that complaint had been lodged with the State Department relative to the discharge into the Allegheny River of the sewage of the institution. It was ascertained at that time

that the point of said discharge was but a few hundred feet above the intake of the Pennsylvania Water Company's system and in the neighborhood of three-quarters of a mile above the intake of the water works system of the city of Pittsburg at the Brilliant Pumping Station. Because public institutions of the State should be among the first to properly dispose of sewage, especially in the cases where the present method is a menace to public health, it was thought fitting that the directors should be requested, rather than legally notified, to discontinue the discharge of the institution's sewage into the river. Therefore, the Department recommended the employment of a competent sanitary engineer to prepare plans for the purification of said sewage.

Such plans were submitted with the above application and were approved on February eleventh, one thousand nine hundred and seven, under conditions set forth as follows:

"L. E. Chapin, C. E.
Frick Building, Pittsburg, Pa.:

Dear Sir: Your plans for the sewage disposal works of the Allegheny County Work House appear to be in conformity with the best practice in the art at this time; and it appears, upon examination of the law, that this institution must be classed among private corporations, over which the Commissioner of Health is by law given authority with respect to such affairs as sewerage and sewage disposal.

It is not, therefore, necessary that the project should be approved by the Governor and Attorney General, as well as the undersigned.

However, should it be necessary in the future to adopt any remedial measures to bring about a better purification of sewage than the works at that time may be accomplishing, and if at any time, in the opinion of the Commissioner of Health, it becomes necessary to enlarge or modify the disposal plant, in the interests of the public health, it is understood and provided that this approval of your plans shall not in any way hold the State responsible, or deprive it of the right to exercise jurisdiction with respect to such remedial measures, modifications, additions, or so forth. In fact, this approval is given with the express stipulation that the Department may, at any time, exercise direction, supervision and control over the construction, operation and maintenance of each sewage disposal works and may stipulate rules and regulations under which said works shall be operated.

Yours very truly,
SAMUEL G. DIXON,
Commissioner of Health."

This approval was not considered explicit enough and the board of directors requested a more formal and specific approval of the proposed plans.

These plans provide for the location of the sewage disposal works on the flats and the lawn between the institution and the railroad. The sewage of the entire institution is to be delivered to a small screen chamber, from thence it is to enter septic tanks to be located in said lawn. The septic tank in its entirety is to be thirty-eight feet wide by one hundred feet long, divided into two parts by a partition wall, each department being sub-divided by a lateral wall whose object is to increase the distance travelled by the sewage.

Across the inlet end of the entire tank are the inlet and outlet chambers. The inlet chambers will serve as grit basins. There are two of them, one for each inlet compartment; there is but one outlet chamber. It is to receive the effluent from either one or both of the two outlet compartments. This outlet chamber is provided with a syphon and is to serve the purpose of a dosing tank to the sprinkling filters. The capacity of the entire septic tank is two hundred thousand gallons, or the present daily output of sewage maximum flow. It is estimated that the entire average sewage output from the enlarged institution will not exceed two hundred thousand gallons, provided the separation of the sewage from all roof and storm water be effected. Therefore, the displacement in the entire septic tank at this rate will be twenty-four hours, or twelve hours average displacement if the flow be delivered to one department of the septic tank. These capacities give ample opportunity for fluctuations in flow, and assure favorable periods of displacement necessary for desirable septic action on the basis of two hundred thousand gallons daily.

The tanks are to be built of re-inforced concrete and roofed over with the same material. Vents for the escape of combustible gases are provided to insure the safety of the structure and prevent any nuisance. The vents are connected with a three inch iron pipe which is to extend to the nearby greenhouse where all gases will be burned.

When it becomes necessary to clean either septic tank compartment, the liquid will be drawn down together with the accumulated deposits into the grit chamber whose depth extends below the bottom of each septic tank compartment. From each grit chamber an eight inch pipe connects with an eight inch sewer main which is to pass underneath the railroad and terminate on the flats. The intention is to use the solids thus emptied from the tanks to fertilize the crops grown in the garden. No special prepared area is designed for the disposal of the sludge.

The sewage from each septic tank compartment is to pass out under a baffle board or plate extending three feet below the surface of the flowline, and over a weir full width of each outlet channel or compartment into the syphon chamber, whose capacity is about five thousand gallons. From this chamber an eight inch cast iron pipe is to deliver the septic effluent under pressure to the sprinkling filters to be located beyond the railroad on the flats near the gas plant.

The elevation of the flow line or the weir at the septic tank is seven hundred and fifty-nine. The elevation of the top of the sprinkling nozzles, which are six inches above the surface of the sprinkling filters, is seven hundred and forty-nine. The bottom of the syphon chamber is elevation seven hundred and fifty-three, so that it appears that during the dosing of the sprinkling filters there will be a head thereon from four to nine feet thereabouts.

The filter comprises an average depth of six and one-half feet of graded broken stone ranging from four inches at the bottom to three-quarters of an inch at the top, resting on concrete floors and being contained by concrete walls forming in its entirety a bed of forty feet wide and one hundred feet long.

The eight inch pressure pipe is to extend about mid-depth longitudinally through the filter and be provided with a blow-off through the end wall, which blow-off is to be connected with channels dug in the surface of the ground into which the sewage is to percolate. Off of this delivery main are to be taken three inch horizontal lines ten feet from and parallel to each other, supplying two inch rises located on ten foot centres over the entire surface of the bed. These rises are to be topped by some approved form of sprinkling nozzle so arranged that it may be taken off and the riser plugged if necessary. No valve whatever is provided for the system of distribution in the filter bed. The adjustment of the volume of sewage to its requisite area is to be accomplished by the regulation of the number of nozzles that should be used.

The underdrainage system comprises channels extending across the width of the bed, parallel and six feet three inches apart, making in all sixteen of them, each to be placed at the bottom, of alternate ridges and valleys and each to be six inches in diameter covered with brick set flatwise, with spaces between of one and one-half inches. Each channel is to extend through the side walls into an outer compartment walled up to the height of the filter bed surface and containing in its bottom the effluent channel. This compartment is two and one-half feet wide and one hundred feet long on each side of the filter bed and is provided to admit of ready cleaning of the under drain system and at the same time protect the filter beds and the under drains.

The main outdrain from the filter plant is to be ten inches in diameter and is to terminated in a sedimentation pond located on the banks of the river excavated in the earth three feet deep, having a capacity of thirty thousand gallons, and as operated will probably afford at least two hours sedimentation. From this pond the effluent is to be conducted in dirt channels over the edge of the bank to the river.

The successful purification of the institution's sewage at the proposed disposal works, which are meritorious in design, and provide for a modern plant, requires that three things shall be done: first, that the proposed separate sewers shall be constructed and the entire separation of roof and storm water from sewage shall be effected: second, that the disposal of the contents of the septic tanks when they are emptied shall be accomplished in a sanitary manner so that a nuisance shall not be created by odors, that danger of pathogenic infection of vegetables grown on the areas upon which it is proposed to dispose of the septic tank contents, shall be eliminated; and that the effluent from the sprinkling filters after sedimentation shall be purified to a degree comparable with the standard which the Commissioner of Health may require of sewage purification plants in the Allegheny River Valley.

Respecting the first, there can be no debate; sewage only must be delivered to the works.

Respecting the distribution of the septic sludge and sewage upon the area upon which the crops are to be grown, the danger of infection of food stuffs by such sewage spread broadcast over the ground during the growing season not being determinable beforehand, but possibly always present, renders it highly important in the interests of public health that such disposal upon such areas shall be only outside of the growing season. The liquid portion would be readily absorbed by the soil but the solid particles would remain upon the surface of the ground and should be ploughed in before crops are grown.

Respecting the degree of purification attained by the whole plant, the factors which may make it necessary to further treat the filter effluent cannot be foreseen at this time to the extent which would warrant any specific safeguard unless it were the requirement that a rapid sand filter be substituted on the bank of the river in place of the proposed sedimentation pool. However, such an addition or the building of an added sprinkling unit can be better made in the future and at no greater expense than at the present time. Should the board of directors care to assume this expense at once such an addition would be approved.

Under the law, the Allegheny County Work House, while being a public institution, does not operate and maintain a public system of sewers, but it does operate and maintain a private system of sewers. Therefore, it comes within that class of sewers under the law whose discharge of sewage into the river must cease under order of the Commissioner of Health. However, it would be against public policy for the Commissioner of Health to withhold his advice and approval of any plans for the purification of the sewage which the officers of the institution might bring to his attention, more especially since the Commissioner requested the voluntary preparation of such plans in this instance and promised advice and co-operation.

It has been unanimously agreed that the interests of the public health can best be served by the granting of a formal approval is hereby and herein given of the plans of the proposed sewage disposal works and permission for the discharge of the effluent from such treatment works into the Allegheny River, under the following conditions and stipulations:

First: That the proposed plans shall be built under the direction and supervision of the designer, or some engineer equally skilled in the construction of sewage purification works, and that plans of the works as built shall, upon completion of the same, be filed together with such other information in connection therewith as may be required in the office of the State Health Department.

Second. That the proposed separation of sewage from all roof and storm water shall be effected before the disposal works are put in operation.

Third. That the contents of the septic tanks, when emptied, shall be drained onto the surface of the ground on the flats where precaution shall be taken to prevent its passage into the river. During the growing or harvest season such disposal is prohibited. All sewage or sediment should be ploughed in before any crops are grown on the field.

Fourth. Should the board of directors choose to build a rapid sand filter in place of the proposed sedimentation pool, detail plans thereof shall be submitted for approval before said filters are constructed.

Fifth. From time to time, the Department will make examination and tests of this plant, and to facilitate this work reports of the operation of the works shall be made by some competent employee of the institution, which reports must be made upon blank forms furnished by the Department.

Sixth. Should the plant become outgrown at any time or require repairs in the future, such alterations or changes shall be made as the Commissioner of Health may suggest or approve.

Seventh. No pathological material from any laboratory shall be discharged into the system. The proper authorities shall cause these wastes to be incinerated on the premises.

Harrisburg, Pa., March 8th, 1907.

OSBORNE, ALLEGHENY COUNTY.

This application was made by the borough of Osborne, Allegheny county, and is for a modification of the permit issued to said borough under date of January thirteenth, one thousand nine hundred and six, and for permission to install a system of sewers for a part of the borough.

It appears that section four of the conditions and stipulations in the original permit of January thirteenth, one thousand nine hundred and six, provided as follows:

"That between the railroad and the Ohio River a sewage disposal plant shall be installed, and the sewage from the said sewers shall be treated and completely purified before the effluent therefrom is discharged into the Ohio River. Said effluent outlet shall be located at least two hundred feet down stream from the Sewickley Water Works intake crib at an elevation assuring its non-submergence at normal water level above Dam No. 4. Construction of the said disposal works is not recommended. It is deemed better policy for the borough to wait and join Sewickley in a general scheme for the treatment of the sewage of both boroughs."

The petitioners represent that the borough of Sewickley has refused to join the borough of Osborne in the matter of joint sewerage and that Osborne borough, therefore, must have an independent sewer system and an independent outlet into the Ohio River.

Osborne is a residential suburb of Pittsburg, and owing to the class of its citizens, who are resourceful, and to the development of the territory, the population, which approximates four hundred and fifty, is not likely to increase very much.

On the west Osborne is bounded by the borough of Sewickley, on the north and east by the township of Aleppo and on the south by the Ohio River.

The village of Haysville is partly in the eastern end of Osborne and partly in Aleppo township. The area so bounded is small, being about one mile long on the river and about one-half mile wide. Over fifty per cent. of the territory is hilly. North of Beaver Road, which parallels and is about one thousand feet

distant from the river, the hill-sides begin. Their summits extend back about a mile or more and are drained by three ravines, one of which is in the extreme eastern and one in the extreme western part of the borough. The other ravine is about eighteen hundred feet distant from the Sewickley boundary, thus dividing the territory into three drainage districts, of which the western is the smallest.

Storm water from these districts has to pass for short distances only over the surface of the ground, or in the gutters of the streets, to the streams. Therefore, irrepective of other considerations, the topography of the borough and economy also prescribe exclusion of surface water from the sewage conduits. It is infeasible, of course, to permit the discharge of sewage at convenient points into the nearby streams, and consequently, while the surface water can find quick access into these natural drainage courses, the sewage must be conveyed underground for long distances to some remote point for disposal.

In the central drainage district there is now a private sewer serving the T. Hare Estate and vicinity, and in the eastern district, at Haysville, there is also a neighborhood private sewer discharging into the Ohio River. Both of these outlets are above the United States Government Lock Dam Number Three. So also—and within fifteen miles—are the outlets of the sewage of over half a mililon people of the cities of Allegheny and Pittsburg.

Below the dam, near the municipal boundary, the fifteen inch sewer main of the Sewickley borough discharges into the river. The water supplied jointly to Sewickley and Osborne is taken from a crib about two hundred feet up stream from this sewer and from thence it is pumped to settling basins and storage reservoirs on the hill, from which the two municipalities are supplied by gravity.

The area it is proposed to sewer is the said western drainage district. It comprises less than fifty acres and contains a passenger station, green-house, four barns and nine dwellings. There are not likely to be constructed in the future more than seven houses whose sewage would enter the proposed sewer system.

It appears that the Sewickley Water Commission interposes no objection, but has consented in writing to the proposed Osborne sewers discharging into the Ohio River at the same point where the Sewickley sewer enters the river.

The Ohio River above and below the Sewickley water works crib is receiving large quantities of crude sewage.

When a public water supply is taken from a sewage polluted source, human life is always more or less in danger, even if approved filtration of the water be resorted to. In this case there is no way provided for the regulating of the crib filter or of controlling or maintaining a standard of efficiency; therefor, the danger is correspondingly increased.

When the slack water improvements of the Ohio River are completed in the vicinity of Sewickley, such slack water will extend over this intake crib and render possible the entrance of sewage from the Sewickley sewer and the proposed Osborne sewer into the said crib.

But such an addition, it is reported, has been refused by the authorities of the borough of Sewickley.

Regardless of whatever disposition may be made of this sewage, it is clearly apparent that the present water supply of Sewickley is liable to dangerous contamination at all times, and especially so during those periods when the slack water shall cover the intake crib of the system.

The Department of Health has called the attention of the Sewickley authorities to the danger of relying on the efficiency of the intake crib to effectually remove the sewage pollution existing in the Ohio River, and has urged the adoption of an up-to-date filtration plant.

The treatment of the sewage of Osborne and other municipalities in the Ohio Valley has become a public necessity and sewage disposal works will be required at as early a time as practical. Meantime, it is important that Sewickley and Osborne should cease to contribute to the pollution of their own water supplies, else other municipalities cannot be consistently required to cease the pollution thereof. Hence it would be entirely foreign to the policy of the State to permit the discharge of sewage from the proposed sewers into the Ohio River.

It is represented by the petitioners that the sewage of the new district under discussion is disposed of into cesspools, and that at some of the estates there are a eries of percolating cesspools and at other estates the receptacles are made purposely water-tight to prevent backflooding of the cellars. Also it is represented that the time of one man with a horse and wagon is taken in pumping out the contents of such cesspools, so that not only are objectionable odors apparent on front porches of some of the residences, but that such nuisance is a neighborhood one and the present expense of disposing of the sewage being very considerable, it would appear that sewers are necessary in this district.

In the ravine near the boundary line of the borough there is an opportunity for the installation of a small sewage disposal plant, whereby sewage from the dwellings in the district could be discharged by gravity to the works.

The petitioners ask permission to construct eight hundred and twenty-five feet of twelve inch sewer in a private way to river, seven hundred and fifty feet of ten inch sewer in McKown street and nine hundred and forty feet of eight inch sewer in Beaver Road.

It has been determined that the interests of the public health demand that a permit be granted, and it is hereby and herein granted, for the construction of the proposed sewers, under the following conditions:

First: That the sewers shall receive sewage only and that the sewage shall be treated in a sewage purification plant to be designed for the purpose, plans of which shall be submitted to the Department of Health for approval before the works are constructed.

Second: No pathological material from any laboratory shall be permitted to discharge into the system. The proper authorities shall cause such wastes to be incinerated on the premises.

Harrisburg, Pa., June 10th, 1907.

OSBORNE, ALLEGHENY COUNTY.

This application was made by the borough of Osborne, Allegheny county, Pennsylvania, and is for permission to install a system of sewerage and sewage disposal works and to discharge the sewage therefrom into the Ohio River, within the limits of the said borough.

It appears that the borough of Osborne is a residential suburb of Pittsburg, located on the main lise of the Pittsburg, Fort Wayne and Chicago Railroad, a few minutes ride west of Pittsburg. It is located on the north bank of the Ohio River and is bounded on the west by the borough of Sewickley and on the north and east by the township of Aleppo.

The population comprises the more resourceful class, is about five hundred, and owing to the class of estates now existing, the development of the territory and the population is not likely to charge materially in the near future. The municipal territory is small, being about one mile long along the river and about a haif mile wide. Over fifty per cent. of it is hilly. The hillsides begin north of Beaver Road. This thoroughfare parallels and is about one thousand feet distant from the river. The railroad lies between the highway and the stream. The summits of the hills are back about a mile or more and are drained by three ravines, one of which is in the extreme eastern part and one in the extreme western part of the borough. The middle ravine is about eighteen hundred feet distant from the Sewickley boundary, thus dividing the territory into three drainage districts, of which the western is the smallest.

The village of Hayesville is partly in the eastern end of Osborne borough and partly in Aleppo. Here there is a neighborhood sewer discharging into the Ohio River and in the central drainage district there is a private sewer serving the T. Hare Estate and vicinity. Both of these outlets are above the United States Government Lock Dam Number Three. Within fifteen miles are the sewer outlets into the river, serving possibly five hundred thousand people.

Below the dam, near the municipal boundary, the Sewickley water works intake is located and the water is drawn from it by works owned and operated by said municipality, from which water is also furnished to the borough of Osborne.

On May ninth, nineteen hundred and seven, the borough of Osborne asked approval of plans for the construction of sanitary sewers in the said western drainage district and for permission to discharge the sewage therefrom into the Ohio River. This area comprises less than fifty acres, contains the passenger station, nine dwellings, and there are not likely to be constructed in the future more than a dozen houses there. However, the Commissioner of Health issued a permit on June tenth, nineteen hundred and seven, under the express stipulation that sewers shall reveive sewage only and that the sewage shall be treated in a sewage purification plant to be designed for the purpose, plans of which shall be submitted to the Department of Health for approval before the works are constructed.

The plans herein considered provide for the collection of sewage from all of the borough and for the purification thereof.

The petitioners submit for approval a complete plan of sanitary sewerage for all of the territory between Beaver street and the river, so designed as to admit of future extensions on the hillsides whenever necessity may require it. The system comprises twelve hundred feet of six inch pipe, three thousand feet of eight inch pipe and thirteen hundred feet of ten inch pipe, all to be terra cotta and about fifteen hundred feet of cast iron pipe eight inches and ten inches in diameter.

On all the vitrified sewer pipe "Y" branches are to be provided on both sides at each fifty foot interval. Manholes are to be placed at each change in grade or alignment of sewer and a flush tank will be located at the upper end of each sewer and connected either with the local water works system or with spring water from springs on the hillsides.

Owing to the topography and the design to collect the sewage at one point, it is necessary to pass some of the sewer lines through private property.

The sewage from Center street which is in that part of Haysville village within the borough is to be conducted by an eight inch pipe across private land between the railroad and the river to the site of the proposed disposal plant on land now or formerly of Mrs. C. B. Duncan, whence it will have to be lifted into the sand disposal plant. Otherwise, all of the sewage will flow by gravity to the works.

It is proposed to use a hydraulic lift, the water to operate the same to be supplied from the public water works, or from surface water piped down from such elevation as will give sixty pounds pressure at the lift plank. The apparatus is to be installed according to some guaranteed bid from such apparatus contractors as have devices of this kind. The plant shown on the plan was that of the "Duluth," with a capacity of five thousand gallons per day against a total head of about twenty feet and requiring about eight hundred gallons of water per day for its operation. This water is to be discharged out onto the river bank, while the sewage is lifted to and into the inlet compartment of the septic tank. The plan shows a six inch tile overflow from the sewer at the chamber designed to enclose the hydraulic lift.

Where railroad crossings are encountered or otherwise to protect against breakage of the sewer, iron pipe is provided.

There are approximately forty houses in the borough, which by reason of the extent of lands and lavish use of water are estimated to produce one thousand gallons of water which would reach the sewer daily, an extreme amount giving a total sewage output from them of forty thousand gallons daily. There are also twenty-five houses along Center street which may use twenty gallons per day each, giving a total output of five thousand gallons for the Center street sewer, making a total of forty-five thousand gallons daily, the maximum amount to be provided for at the disposal works.

The plant is to comprise a septic tank and sand filter process. The septic tank is designed in two compartments, each with a working capacity of fifteen thousand gallons or a total of thirty thousand gallons, equivalent to sixteen hour's storage in the septic tank.

The septic effluent is to be treated by intermittent filtration on sand beds to be operated at a rate of not over two hundred thousand gallons per acre per day, which for forty-five thousand gallons of sewage calls for nine thousand eight hundred square feet of sand bed surface.

The plans provide for two filter beds each with forty-nine hundred square feet surface area. The sand for each bed is to be obtained from the river, washed to a grade of about twenty-five hundredths millimeters, effective size, which experience has shown is practicable with river sand when washing out not more than fifteen per cent. of fine material.

The surface of the sand in the filter bed is to be elevation seven hundred and nine, which is the present surface of the ground on the Duncan lot. Ordinary highwater of the river floods this site about three feet deep to elevation seven hundrd and twelve, and extreme high water, which occurred in the spring of nineteen hundred and seven, to elevation seven hundred and twenty. There is no attempt in the design to obviate flooding of the entire plant during extreme high water. But during all ordinary high water times, the sand beds will be protected therefrom by earth embankments which are to be carried up to elevation seven hundred and fourteen which is also to be the elevation of the concrete top of the septic tank. However, Center street sewer will be flooded at each high water period during which time the use of the sewer must be discontinued. The sand in the filters is to be three feet deep. When the water in the river rises high enough to backflood the underdrains, the filters will be put out of commission, unless the effluent therefrom be pumped, which is not intended. Then, therefore, the sewage from the septic tank must flow, untreated into the river flood, and during extreme freshets, when the septic tank is flooded out, the sewage from all but the Center street sewer must be discharged directly into the flood on the Duncan lot.

The septic tank is to be located at the foot of the railroad embankment and at the head of and between the sand filter units. The sewer is to terminate in an inlet chamber outside of the tank, divided by a wall and connected by means of an eight inch iron pipe with gate to its corresponding compartment in the septic tank, which compartment is to be thirty-five feet long, nine feet wide, six and a half feet deep to flow line at the inlet end and seven and a half feet deep at the outlet end. The sewage is to leave and enter each compartment by a submerged eight inch pipe. The tank is to be made of reinforced concrete and to be covered over. There will be twelve inch air space between the roof and the flow line.

The effluent is to fall into a dosing basin whose bottoms and sides are to be paved with brick, grouted, terminated in a syphon chamber six feet square and housed over. The dosing basin is to be sixteen feet wide at the septic tank end and six feet wide at the syphon chamber, about twenty-one feet long and about two and one-half feet deep.

A six inch drain pipe from the bottom of the septic tanks is to extend underneath the filter bed to the river bank. Whenever the septic tank requires cleaning proper valves are provided to admit sufficient sewage to flush out the sludge through the six inch drains onto the gravel beach near the river, or, if found necessary, by a rough sludge filter on the beach. The intention is to do this cleaning when the wind is off shore. The sludge is to be disposed of by evaporation, the liquid filtering into the gravel. It is represented that the deposit of mud caused by rises in the river renders impracticable the maintenance of permanent sludge bed; but when needed, it is further represented that one can be quickly made by banking up the river gravel to form a temporary sludge bed. By this process the sludge, when dry, would be covered by scraping the tank material over the sludge, and so forth.

The dosing tank has sufficient capacity to flood the sand area of each filter to a depth of about three inches. In the syphon chamber are to be placed two ten inch alternating syphons by means of which the dose will be alternately discharged onto the sand filters. A wooden trough placed on the surface of the sand will facilitate distribution. Each bed is to be fifty feet wide by one hundred feet long, excavated in natural earth, the material being thrown up on the sides to form the protecting embankments, longitudinally two lines of six inch tile pipe underdrains are to be laid on the bottom and surrounded by broken stone and over them and in the bed three feet of sand is to be placed. The underdrains are to extend through the embankment to the natural surface of the ground sloping to the river.

The proposed disposal site is in the central drainage district and appears to be the only available place in the borough along the river front. To collect the sewage here and pump it to a remote site on the hillsides would be a very expensive propostion to construct and maintain. The only object in doing this would be to obviate the discharge of sewage at any time into the river. A more reasonable plan would be the perfecting of the proposed lay-out, so that all ordinary floods would not cause a cessation of filter operation. The result can be accomplished by placing backflooding valves on the filter underdrains and conducting the effluent during high water to a pump well whence the liquid would be lifted the requisite height.

In any event, said underdrains should have protection from the river water. Otherwise, sediment will be carried back to them into the sand bed and a clogging thereof be likely to result.

The discharge of crude sewage from the main sewer at an extreme freshet, when the entire disposal plant is out of commission, thereby providing favorable conditions for the stranding of sewage matters along the shores in the immediate vicinity, should be obviated as far as possible. It is entirely feasible to provide for the conducting of the town sewage through the septic tank drain to the river bank and for the discharge of the crude sewage here during said extreme flood, where it will be more thoroughly removed or dispersed in the river.

The proposed method of sludge disposal may prove to be a practical one. There seems to be no reason why a trial of it should not be countenanced.

The providing of facilities for the operation of the Center street sewer during ordinary high water appears to be futile because the land in this district lies lower than elevation seven hundred and ten, and so Center street itself is inundated and the territory temporarily rendered unfit for occupancy.

So far as the Department is informed the proposed sewer system affords sewerage facilities for all occupied estates, so that it is not necessary for any buildings in the borough to continue to discharge sewage from private sewers into the river. Such private sewers should be connected under proper regulation to the proposed borough system.

And when this be done, the proposed sewage disposal works as at present arranged, will be capable of purifying the borough sewage under conditions obtaining during all but a few days in the year, to a degree sufficient to warrant approval of the system. In the future, however, when other municipal sewages have ceased to be discharged into the river or its tributaries, and a higher standard of purification required for the entire district than the proposed Osborne plant may be capable of accomplishing at that time, or for any other reason relative to public health and urgent at the time, it may be necessary to modify, change, improve or extend the plant.

It has been determined that the interests of the public health demand that approval be given and it is hereby and herein given the proposed sewerage and sewage disposal plans under the following conditions and stipulations:

First. That storm water shall be excluded from the system, and that at the close of each season's work plans of the sewers laid during the year shall be prepared and filed in the office of the Commissioner of Health, together with any other information in connection therewith that may be required by the Department.

Second. The local authorities shall, by ordinance or otherwise, provide for the connection with the proposed sewer system of every occupied abutting estate and for the discontinuance of all private sewers discharging into the Ohio

River or any stream or water course within the borough limits, to the end that the pollution of the waters of the State within Osborne borough shall cease.

Third. Detail plans of the hydraulic lift and a copy of the contract therefor and specifications, shall, when adopted by the borough, be filed in the State Department of Health, and if at any time this apparatus proves insufficient to perform its work and to prevent discharge of sewage into the river or anywhere except into the proposed disposal works, then such remedy shall be applied as the Commissioner of Health may suggest or approve.

Fourth. Provision shall be made for the discharge of crude sewage from the main outfall sewer into the river at a point sufficiently removed from the railroad embankment, to assure the non-stranding of suspended matters along the shares in Osborne borough during extreme high freshets when such discharge into the river is to be permitted.

Fifth. The sewage disposal plant herein approved is to be constructed and put in operation at the same time that the sewer system is put in operation and placed under the charge of a competent attendant who shall keep a daily record of such operation on forms to be suggested by the Commissioner of Health, copies of which shall be filed in the office of the said Commissioner, and if at any time the system of sewerage and sewage disposal works, or any part thereof has, in the opinion of the Commissioner of Health, become prejudicial to the public health, or is not properly purifying the sewage, then such remedial measures shall be adopted as said Commissioner may suggest or approve.

Sixth. No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

Seventh. Flood gates shall be placed on the sand filter underdrains to prevent the backflooding of the filters by river water. The suggestions hereinbefore contained relative to the collection of the sand filter effluent in a pump well and its raising to the river height in order to keep the filter plant in operation during ordinary floods, is commended to the consideration of the borough authorities, but it is not insisted upon at this time. It may, however, be ordered whenever the Commissioner of Health deems this necessary, and the borough shall then forthwith provide the proper facilities to accomplish said object, the plans to be approved by the Commissioner of Health at that time.

The attention of the local authorities should be called also to the fact that there are dwellings in the vicinity of the proposed disposal works and that high class maintenance of the plant will be necessary to obviate a nuisance. The proposed filtration rates are high for the type of filter and will require more care in keeping the surface of the sand open and unclogged. A larger sand area may be required in the future or a chemical treatment of the effluent. It is believed, however, that the plans will be adequate and successfully purify the sewage for at least the immediate future.

Harrisburg, Pa., November 9th, 1907.

PHILADELPHIA, FRANKFORD CREEK DRAINAGE DISTRICT.

This approval of plans is given for the extension of sewers in the Frankford Creek drainage district of the city of Philadelphia, county of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State, in compliance with applications duly made and bearing date of March twenty-second, one thousand nine hundred and six, June twenty-eighth, July ninth, one thousand nine hundred and six, July thirty-first, one thousand nine hundred and six, September fourth, one thousand nine hundred and six, September eighteenth, one thousand nine hundred and six, October ninth, one thousand nine hundred and six, February twentieth, one thousand nine hundred and seven and on April eleventh, one thousand nine hundred and seven.

It appears that these sewers are urgent and required for the maintenance of the health of the community and to permit the construction of a large number of buildings demanded by the increase of the population of the city.

The city of Philadelphia comprises the whole of Philadelphia county. It is bounded on the north by Montgomery county, on the east by Bucks county and the Delaware River, on the south by said river and on the west by Delaware county. The area so incorporated comprises one hundred and twenty-nine square miles. Poquessing Creek marks the division between the city and Bucks county on the east, and Darby and Cobbs Creek, the division between the city and Delaware county on the west. The Schuylkill River coming down from the anthracite coal fields and draining a populous water shed of over one thousand square miles, forms the westerly boundary of the Manayunk district of the city to the point where Wissahickon Creek joins the river from the east, whence its course is southerly and entirely within the limits of Philadelphia to its mouth, which is at a point near the southwesterly corner of the city. This stream is tidal for seven miles to Fairmount dam. It is eight miles above this dam to the northerly limits of the Manayunk district, so the Schuylkill River

passes by or through fifteen miles of city territory. Owing to the topography, its drainage area is narrow, and the river itself serves as the immediate channel for the contiguous territory until Wissahickon Creek is reached.

The district west of the Schuylkill is principally residential. More than one-half of it slopes to the river, and the remainder drains to Cobbs Creek, with the exception of the southern section which is largely marsh land subject to inundation.

The commercial part of the city lies in the peninsula east of the Schuylkill between it and the Delaware River. About two-thirds of this area sheds its drainage to the Delaware River. The southern part of this tract is also subject to flood at high water. The Delaware indirectly drains all of the city territory east of the Schuylkill watershed. There is a large area passing up stream as far as Frankford Creek, and between Frankford Creek and Pennypack Creek which directly drains to the river.

The populous Germantown district and Frankford district of the city are in the immediate valley of Frankford Creek.

The Pennypack Creek which is three miles farther up stream traverses a rural country excepting the last mile and a half of its course, but the Poquessing Creek valley is entirely suburban and most rural in character. Excepting it and Wissahickon, the streams mentioned receive large volumes of sewage discharged therein by city sewers.

The sewers extensions herein considered lie within the Frankford Creek drainage district and territory adjacent thereto on the banks of the Delaware River. Frankford Creek is formed by two tributaries known as Wingohocking Creek and Tacony Creek which unite within the city limits at a point about four miles by the course of the stream above the Delaware River.

The Wingohocking Creek is the smaller tributary and the district it drains is wholly within the city of Philadelphia, and immediately east of the Schuylkill River watershed. The creek rises in the northern part of the city, comes down through Germantown and by Wayne Junction, Logan and Feltonville to its confluence with Tacony Creek just above Frankford village. The distance traversed is about six and a half miles.

All sewers in this valley are on the combined plan and they discharge into the creek through two outlets the main one of which is seventeen and twenty-five hundredths feet in diameter and serves three-quarters of the entire valley. Its outlet is into the creek near Sixth and Annsbury Streets. From here to Tacony Creek a distance of one and three-quarter miles the stream is a foul open sewer. About midway of this length the sewer outlet from Wayne Junction increases the pollution.

Tacony Creek rises in Montgomery County above Jenkintown and comes down through that village and the villages of Ashbourne and Cheltenham before it enters the city and traversing in its total length a distance of eight miles, the last two of which are in Philadelphia. A tributary called Rock Run lying wholly within the city west of Tacony Creek joins it about a mile above the Wingohocking Creek. This run drains a long narrow valley, in which Oak Lane, Fern Rock, McCartersville and Feltonville villages are located. The sewers from the last two places which are combined empty into the run.

Into Frankford Creek the combined sewers of Frankford and a part of Bridesburg discharge. There are at least five such sewers in Frankford, the largest being ten and five-tenths feet in diameter and three such sewers in Bridesburg, the largest being four feet in diameter.

Into the Delaware River above Frankford Creek within a distance of two miles there are five combined sewer outlets, the largest of which is nine and six-tenths feet in diameter and into the Delaware below Frankford Creek within a distance of two miles or down stream as far as Wheatsheaf Lane there are three sewer outlets in Bridesburg, the largest of which is six feet in diameter.

Frankford Creek is in a foul and insanitary condition. On the flood tide the polluting matter discharged by it is carried by the currents up stream past the Delaware River intakes of the Philadelphia water works system and thus menaces the water supply.

There is some pollution on the water shed outside of the city. The local authorities in Jenkintown and Cheltenham are considering the question of sewerage. The State will exercise jurisdiction in this territory.

The plans submitted and the lists accompanying them comprise extensions to these existing sewers in the district now discharging into the Delaware River of a total of six thousand seven hundred and ten feet of combined sewers, the sizes being equivalent to about a two and five-tenths foot circular conduit, of which two thousand four hundred and thirty-five feet are above the Frankford Creek, one thousand eight hundred and seventy-five feet being designated in the list forwarded on March twenty-second, one thousand nine hundred and six, and five hundred and sixty feet were designated in the list forwarded on September eighteenth, one thousand nine hundred and six and forty thousand two hundred and seventy-five feet are in the territory below Frankford Creek, three thousand four hundred and fifty feet being designated in the list forwarded on March twenty-second, one thousand nine hundred and six, and eight hundred and twenty-five feet being designated in the list forwarded September eighteenth, one thousand nine hundred and six.

The plans submitted and the lists accompanying them comprise extensions to existing sewers or the creation of new outlets (five) into Frankford Creek of a total of twenty-five thousand three hundred and eighty-four feet of combined sewers whose sizes range from one foot to fourteen feet in diameter of which twenty-one thousand six hundred and fourteen feet were designated on the list forwarded on March twenty-second, one thousand nine hundred and six, seven hundred and seventy feet in the list forwarded September eighteenth, one thousand nine hundred and six, seven hundred and sixty feet designated in the list forwarded October ninth, one thousand nine hundred and six and two thousand two hundred and forty feet designated in the list forwarded February twentieth, one thousand nine hundred and seven.

The plans submitted and the lists accompanying them comprise extensions to existing sewers or the creation of new outlets (three) of the Wingohocking Creek system of a total of ninety-two thousand one hundred and fifteen feet of combined sewers whose sizes range from one foot to twelve feet in diameter. The lengths of feet designated in each list and the date of each list are as follows:

Fifty-six thousand nine hundred and forty-seven feet, March twenty-second, one thousand nine hundred and six.

Seven thousand and thirty-five feet, June twenty-eighth, one thousand nine hundred and six.

Four thousand five hundred and sixty-eight feet, July ninth, one thousand nine hundred and six.

Five hundred and twenty-five feet, July thirty-first, one thousand nine hundred and six.

Seven hundred and thirty feet, September fourth, one thousand nine hundred and six.

Five hundred and twenty-nine feet, September eighteenth, one thousand nine hundred and six.

One thousand eight hundred and seventy-nine feet, October ninth, one thousand nine hundred and six.

Two thousand eight hundred and thirty-eight feet, February twentieth, one thousand nine hundred and seven.

Seventeen thousand and sixty-four feet, April eleventh, one thousand nine hundred and seven.

The plans show a new combined sewer five and five-tenths feet in diameter, nineteen hundred feet long discharging into Tacony Creek at Whittaker Street. In this basin but in the valley of Rock Run the plans submitted and lists accompanying them comprise extensions to existing combined sewers of a total of two thousand three hundred and ten feet, sizes three by two feet, of which fifteen hundred and fifty feet were designated in the list forwarded on June twenty-eighth, one thousand nine hundred and six and seven hundred and sixty feet in the list of July ninth, one thousand nine hundred and six. The new Tacony Creek outlet was listed March twenty-second, one thousand nine hundred and six.

The city has recognized the importance of improving the sanitary condition of the territory contiguous to Frankford Creek and has designed what is known as the Frankford intercepting system on a comprehensive scale whose object is to effect a restoration of the creek from an open sewer to an unpolluted water course. The plan comprises the collection of the present sewage and sewage from prospective conduits in the Tacony and Wingohocking valleys by main sewers which are to unite into one large outfall to be laid from the junction of Tacony and Wingohocking Creeks along Frankford Creek to Frankford avenue whence it is to extend directly south in Wheatsheaf Lane to the Delaware River. In connection with this plan the creek bed is to be improved and possibly arched over and a broad avenue constructed over it. A parkway in the Tacony valley is contemplated. Outlines of a plan for the interception of the sewage now discharged into the lower Frankford Creek have not yet been made so far as the Department is informed. The Wingohocking system which is comprehensive and whose extensions have served to open up tracts for development and necessary street improvements in the last few years, has been built in general conformity with the projected intercepting system. The demand for the completion of an intercepting system in the Frankford Creek drainage district is imperative. This end should be brought about as no doubt it will by the city authorities at the earliest practicable moment.

North of the Wheatsheaf Lane there is a large tract of low land subject to inundation and now used for cultivation of garden truck which would seem to afford a good site for the ultimate location of sewage disposal works designed to serve the Frankford Creek district and adjacent districts. Sewers emptying into the Delaware River on either side of this tract might be economically intercepted and their contents delivered to this site for purification.

In determining the details of a plan of sewerage and sewage disposal works, in so far as such details may be necessary to formulate a plan by which sewer extensions in this district should be made, a very broad outlook on all of the interests concerned is requisite. Many of these interests are wholly within the scope of matters about which the city's representatives are alone concerned, but

a few of them are material to the work of improved sanitation in the Delaware and Schuylkill River basins and the State at large about which the State representatives are primarily concerned and therefore public welfare can best be subserved by co-operation between the State and city authorities to the end that some practical plan of procedure shall be definitely agreed upon.

In view of these and other considerations, it has been unanimously agreed by the Governor, Attorney General and Commissioner of Health that approval be given and it is hereby and herein given to the plans submitted by the city for the extension of sewers in the Frankford Creek drainage district and territory adjacent thereto on the banks of the Delaware River in conformity with the lists forwarded on the several dates hereinbefore given, under the following conditions and stipulations.

First. That the city shall on or before the year one thousand nine hundred and twelve prepare and submit to the State Department of Health for approval a comprehensive sewerage plan for the collection and disposal of the sewage of the entire Frankford Creek drainage district.

Second. The city shall in the interim forward plans and lists of sewers authorized to be built by the councils of the city from time to time, giving the name, size and length of each sewer extension upon the plans, to the State Department of Health, which extensions shall be immediately approved provided some progress shall be made each year in the study of a comprehensive system of sewerage for the entire Frankford Creek drainage district and provided that said sewer extensions as far as practicable shall not be at cross purposes with said comprehensive system.

Third. No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

Harrisburg, Pa., April 23d, 1907.

PHILADELPHIA, PENNYPACK CREEK DRAINAGE DISTRICT.

This approval of plans is given for the extension of sewers in the Pennypack Creek drainage district of the city of Philadelphia, county of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State in compliance with applications duly made and bearing date of March twenty-second, one thousand nine hundred and six, May thirty-first, one thousand nine hundred and six, and April eleventh, one thousand nine hundred and seven.

It appears that these sewers are urgent and required for the maintenance of the health of the community and to permit the construction of a large number of buildings demanded by the increase of the population of the city.

The city of Philadelphia comprises the whole of Philadelphia county. It is bounded on the north by Montgomery county, on the east by Bucks county and the Delaware River, on the south by said river and on the west by Delaware county. The area so incorporated comprises one hundred and twenty-nine square miles. Poquessing Creek marks the division between the city and Bucks county on the east, and Darby and Cobbs Creek, the division between the city and Delaware county on the west. The Schuylkill River coming down from the anthracite coal fields and draining a populous water shed of over one thousand square miles, forms the westerly boundary of the Manayunk district of the city to the point where Wissahickon Creek joins the river from the east, whence its course is southerly and entirely within the limits of Philadelphia to its mouth, which is at a point near the southwesterly corner of the city. This stream is tidal for seven miles to Fairmount dam. It is eight miles above this dam to the northerly limits of the Manayunk district, so the Schuylkill River passes through fifteen miles of city territory. Owing to the topography, its drainage area is narrow, and the river itself serves as the immediate channel for the contiguous territory until Wissahickon Creek is reached.

The district west of the Schuylkill is principally residential. More than one-half of it slopes to the river, and the remainder drains to Cobbs Creek, with the exception of the southern section which is largely marsh land subject to inundation.

The commercial part of the city lies in the peninsula east of the Schuylkill between it and the Delaware River. About two-thirds of this area sheds its drainage to the Delaware River. The southern part of this tract is also subject to flood at high water. The Delaware indirectly drains all of the city territory east of the Schuylkill water shed. There is a large area passing up stream as far as Frankford Creek, and between Frankford Creek and Pennypack Creek which directly drains to the river.

The populous Germantown district and Frankford district of the city are in the immediate valley of Frankford Creek.

The Pennypack Creek which is three miles farther up stream traverses a rural country excepting the last mile and a half of its course, but the Poquessing Creek valley is entirely suburban and most rural in character. Excepting it and Wissahickon, the streams mentioned receive large volumes of sewage discharged therein by city sewers.

The sewer extensions herein considered lie within the Pennypack Creek drainage district.

The village of Holmesburg is on Pennypack Creek, distant about one and a half miles gy stream from the Delaware River. Its sewers which are on the combined plan, discharge into the creek. There are three outlets whose diameters are three and five-tenths feet, four and four and five-tenths feet. North of the creek on the banks of the river is located the new Torresdale water filtration plant, by means of which a large proportion of Philadelphia's water supply is to be filtered.

Some sewage pollution of Pennypack Creek occurs on the water shed outside of the city to the menace of the citizens of Holmesburg who derive their supply from the creek above the village. The water is subjected to filtration.

The plans submitted and the lists accompanying them comprise extensions to the existing sewers of a total of eight thousand two hundred and seventy feet of combined sewers, sizes ranging from two and twenty-five hundredths by one and five-tenths to five feet in diameter of which five hundred and sixty-five feet were designated in the list forwarded March twenty-second, one thousand nine hundred and six, four thousand nine hundred and forty feet were designated in the list forwarded on May thirty-first, one thousand nine hundred and six, and one thousand seven hundred and sixty-five feet were designated in the list forwarded April eleventh, one thousand nine hundred and seven.

On Pennypack Creek between Holmesburg and the River, are located the county prison and the house of correction. At a recent municipal election the voters authorized the creation of a debt including an item of one hundred and fifty thousand dollars for sewerage and sewage disposal works for the county prison, house of correction and for the proposed home for indigents to be erected on an eight hundred acre tract abutting Poquessing Creek. A loan for this amount for said purposes is now being negotiated by the municipal authorities. This shows a lively interest on behalf of the city in safeguarding, so far as it has jurisdiction to do so, its water supply from sewage pollution. The State has taken up this subject in territory beyond the city limits and has secured an interstate co-operation whereby New York, New Jersey and Pennsylvania will bring about in their respective jurisdictions the discontinuance of the discharge of sewage into the waters of the Delaware basin above Philadelphia at as early a time as shall be practicable, in each instance. The nearest municipality in Pennsylvania on the river above Philadelphia is now, through the earnest efforts of the State Department of Health and the co-operation of its representative citizenship, preparing plans to take all sewage out of the river by means of a system of sanitary sewerage and sewage purification works.

The treatment of the sewage from the proposed home for indigents is advisable and necessary, and this is true also with respect to the county prison and house of correction.

It is understood that the one hundred and fifty thousand dollars appropriation may also be drawn upon to defray the cost of treating sewage from other municipal institutions near Torresdale, including the wash water from the Torresdale Filter Plant and the sewage of Holmesburg.

The Department is informed that councils have authorized the laying out of a very desirable addition to the city parkway system comprising a stretch of land from five hundred to one thousand feet wide on either side of Pennypack Creek, extending from Frankford avenue in Holmesburg six and one-half miles northerly to the county line, in all told, approximately fifteen hundred acres. As this section of the city becomes developed, prohibition of the discharge of sewage anywhere into the creek along this Parkway must be rigidly enforced from an aesthetic as well as sanitary standpoint, and since the necessity for sewage purification works at the public institutions on the stream below Holmesburg now exist, is recognized and provided for, it is clearly apparant that the site for such works should be so chosen as to be adapted to enlargement from time to time to meet the necessities of the entire district.

It would seem to be prudent at this time to adopt and approve a plan comprehensive and elastic whereby the existing sewage of the district shall be intercepted and treated by some approved plan, and that hereafter all sewers built in the district shall conform to this plan.

In view of these and other considerations, it has been unanimously agreed by the Governor, Attorney General and Commissioner of Health that approval be given and it is hereby and herein given to the plans submitted by the city for the extension of the sewers in the Pennypack Creek drainage district under the following conditions and stipulations:

First. That before works for the treatment of the sewage of the city and county institutions in the Pennypack Creek drainage district and for the discharge of effluents from such works into the waters of the State are constructed, the plans thereof shall be submitted to the Governor, Attorney General and Commissioner of Health for approval and that the city shall in conjunction with the State Department of Health consider the feasibility of so locating such works that they may be adapted to enlargement to receive and dispose of all of the sewage, present or prospective, in the said Pennypack Creek drainage district.

Second. That on or before the year one thousand nine hundred and twelve the city shall prepare and submit to the State Department of Health for approval a comprehensive sewerage plan for the collection and disposal of the sewage of the entire Pennypack Creek drainage district.

Third. No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

Harrisburg, Pa., April 23d, 1907.

PHILADELPHIA, COBBS CREEK DRAINAGE DISTRICT.

This approval of plans is given for the extension of sewers in the Cobbs Creek Drainage District of the city of Philadelphia, county of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State, in compliance with applications duly made and bearing date of March twenty-second, one thousand nine hundred and six; June twenty-eighth, one thousand nine hundred and six; July ninth, one thousand nine hundred and six; July thirty-first, one thousand nine hundred and six; September fourth, one thousand nine hundred and six, October ninth, one thousand nine hundred and six; November fifteenth, one thousand nine hundred and six; February twentieth, one thousand nine hundred and seven, and April eleventh, one thousand nine hundred and seven.

It appears that these sewers are urgent and required for the maintenance of the health of the community and to permit the construction of a large number of buildings demanded by the increase of the population of the city.

The city of Philadelphia comprises the whole of Philadelphia county. It is bounded on the north by Montgomery county, on the east by Bucks county and the Delaware river, on the south by said river and on the west by Delaware county. The area so incorporated comprises one hundred and twenty-nine square miles. Poquessing Creek marks the division between the city and Bucks county on the east, and Darby and Cobbs Creek, the division between the city and Delaware county on the west. The Schuylkill River coming down from the anthracite coal fileds and draining a populous watershed of over one thousand square miles, forms the westerly boundary of the Manayunk District of the city to the point where Wissahickon Creek joins the river from the east, whence its course is southerly and entirely within the limits of Philadelphia to its mouth, which is at a point near the southwesterly corner of the city. It is eight miles above this dam to the northerly limits of the Manayunk District, so the Schuylkill River passes by or through fifteen miles of city territory. Owing to the topography its drainage area is narrow, and the river itself serves as the immediate channel for the contiguous territory until Wissahickon Creek is reached.

The district west of the Schuylkill is principally residential. More than one-half of it slopes to the river, and the remainder drains to Cobbs Creek, with the exception of the southern section which is largely marsh land subject to inundation.

The commercial part of the city lies in the peninsula east of the Schuylkill between it and the Delaware River. About two-thirds of this area sheds its drainage to the Delaware River. The southern part of this tract is also subject to flood at high water. The Delaware indirectly drains all of the city territory east of the Schuylkill water shed. There is a large area passing up stream as far as Frankford Creek, and between Frankford Creek and Pennypack Creek which directly drains to the river.

The populous Germantown District and Frankford District of the city are in the immediate valley of Frankford Creek.

The Pennypack Creek which is three miles farther up stream traverses a rural country excepting the last mile and a half of its course, but the Poquessing Creek valley is entirely suburban and most rural in character. Excepting it and Wissahickon, the streams mentioned receive large volumes of sewage discharged therein by city sewers.

The sewer extensions herein considered lie within the Cobbs Creek Drainage District.

Cobbs Creek rises in Delaware county near Lower Merion township and comes down through a rolling country for about four miles to the Philadelphia line, whence it is the boundary line between Philadelphia and Delaware counties until it joins Darby creek, the confluence being six miles distant from the Delaware River. Below the forks the stream takes the name of Darby Creek. At the forks Colwyn borough is located, and just above it Darby borough, Delaware county, and again north of Darby is Yeadon borough. The sewers of these places discharge into Cobbs creek at or below Woodland avenue. The largest is twenty-four inches in diameter. So far is known these constitute the only public sewers in Delaware county discharging into Cobbs Creek.

In Philadelphia, in the vicinity of Woodlawn avenue, there is quite a settlement growing rapidly known as Paschalville. The district is served by a combined sewer five and one-half feet in diameter which empties into Cobbs Creek

at Woodlawn avenue. In the vicinity in Greenway avenue there is a combined sewer four and one-half feet in diameter. About a mile and a half up stream is another outlet eleven feet in diameter known as the Thomas Run sewer which serves quite an extensive area as far north as Market street. In the vicinity there is also a sewer outlet four and one-half feet in diameter at the foot of Chester avenue. At Market street the Robinson street system outlet is located six and one-half feet in diameter, and just below it in Spruce street there is a combined sewer outlet three and one-fourth feet in diameter.

The creek is located in a narrow winding and in portions well wooded gorge upon those banks in Delaware county outside of the boroughs mentioned, there are extensive cemeteries and upon whose banks and adjoining table-land in Philadelphia building operations are intensely active, and in the near future a well built up residential district is there assured.

The creek is now badly polluted and during summer times when the flow from its limited area of drainage must be naturally small, a considerable portion of its volume is undoubtedly discharged from the city sewers. Above Market street there is an important tributary called Indian Run whose east and west branches drain Narberth borough, Ardmore and Wynnewood villages in Lower Merion township, and come down through Overbrook and Haddington villages in Philadelphia to the main creek. This run receives the flow of two sewers in Philadelphia, and some pollution from Narberth borough. One of the sewers in Sixty-fifth street is connected with the Lower Merion township outfall sewer which is twenty-four inches in diameter and takes house sewage only. The city sewer into which it discharges is six feet in diameter; it empties into the East Branch of Indian Run. The other sewer is at the foot of Lebanon avenue. The run also receives industrial wastes, and altogether they render the waters extremely foul and a menace to public health.

The plans submitted and the lists accompanying them comprise extensions to the existing sewers in the Cobbs Creek Drainage District or the establishment of new sewer outlets aggregating a total of ninety-seven thousand three hundred and thirty-five feet of combined sewers whose sizes range from two to six feet in diameter, of which fifty-five thousand nine hundred and twenty-four feet were designated in the lists forwarded on March twenty-second, one thousand nine hundred and six; nine hundred and seven feet in the list of June twenty-eight; twenty thousand five hundred and sixty-six feet in the list of July ninth; four hundred and eighty feet in the list of July thirty-first, one thousand three hundred and thirty-seven feet in the list of September fourth, three thousand one hundred and twelve feet in the list of October ninth, one thousand feet in the list of November fifteenth, one thousand nine hundred and five, five thousand six hundred and forty-five feet in the list of February twentieth, one thousand nine hundred and seven, and eight thousand three hundred and sixty-seven feet in the list forwarded April eleventh, one thousand nine hundred and seven.

In the above list submitted on March twenty-second, one thousand nine hundred and six, there is designated eight thousand feet of sewer four and one-half feet in diameter to receive house sewage only and named Cobbs Creek interceptor. It extends along the east bank of the creek from a point just above Darby Creek, to a point a few hundred feet below Chestnut avenue and Thomas Run sewer outlet. It will intercept the Woodland avenue and Greenway avenue outlets, and also all new main sewers laid in the district within the limits of the city of Philadelphia.

The city contemplates the extension of the Cobbs Creek interceptor up the valley and up Indian Run to the city line. All dry weather flow is to be diverted into this structure and the first flush of storm water. The outlet appearing on the plan is into Cobbs Creek near Darby Creek. The stream here is very sluggish, tidal, its banks are low, and the land on either side is flooded at high water. This obtains with about all the country between the creek and the Delaware River. The permanent discharge of the sewage into this stream from the numerous municipalities along Darby Creek as well as from the increasing population on Cobbs Creek, is not a question of expediency as much as a question of suitability. From the standpoint of a nuisance it does not appear at present that there are complaints to be made by the users of the creek below Colwyn. At various points numerous boat houses dot the bank of the stream and considerable fishing is indulged in. The waters are highly polluted and undoubtedly this may interfere to some degree with the sport, and in a sense menace the lives of those who may boat upon its waters; but it is above Colwyn in the populous districts where a demand for the cessation of the discharge of sewage into the stream exists. The solution of all pollution of inland streams whose banks are populated is to provide intercepting sewers along them to divert sewage therefrom and to convey it to larger bodies of flowing water or to sewage disposal works.

The building of sewers in the district to keep pace with the development of real estate is of first importance, but the intercepting system should also be extended to keep pace with the development. A plan is on foot to include Cobbs

Creek in the city parkway system. In such a way the valley can be put to profitable use. The embellishment of this gorge would at once be an asset to the district and the city at large. A parkway system commensurate with the importance of Philadelphia may well include Cobbs Creek in its scope. Since the creek is in two counties, and the area in Delaware county is likely to be occupied by residences, there will be no good sites for purification works outside of the valley of the creek itself in which the parkway may be located. It would seem in the event of the preemption of this valley by the city for park purposes, that the intercepting sewer to be built therein should provide for the conveying of at least house drainage from the territory tributary to the creek in Delaware county, for in no other way can the sewage therefrom be so satisfactorily disposed of. It is good public policy to reduce the number of sewage purification plants to the minimum. At best such works require great care and attention and are liable to cause a nuisance. It is good public policy, where feasible, to concentrate this care and attention at one place. The project of constructing the Cobbs Creek interceptor across the country to the Schuylkill River is now being studied and surveys are under way by the city engineer. If carried out this plan would bring about the collection to one point of all of the sewage from the Cobbs Creek and Schuylkill River drainage district in event of intercepting sewers being laid along the banks of the Schuylkill River.

In view of these and other considerations and because the city has found it possible to permit the municipalities outside of Philadelphia to discharge their sewages into the city system in the Indian Run Branch of the Cobbs Creek district, it has been unanimously agreed by the Governor, Attorney General and Commissioner of Health that the interests of the public health demand that approval be given and it is hereby and herein given to the proposed sewer extensions in the Cobbs Creek drainage district as designated by the above mentioned lists and plans forwarded under the several dates given, under the following conditions and stipulations:

FIRST: That the city shall on or before the year one thousand nine hundred and twelve prepare and submit to the State Department of Health for approval a comprehensive sewerage plan for the collection and disposal of the sewage of the entire Cobbs Creek Drainage District within the limits of the city of Philadelphia, and elsewhere, if this be desirable, and that the city shall in conjunction with the State Department of Health, consider the feasibility of so laying out such comprehensive system that it may be adapted to receive and dispose of the sewage of the municipalities in the drainage district outside of the city limits.

SECOND: The city shall, in the interim, forward plans and lists of sewers authorized to be built by councils of the city from time to time, giving the name, size, length of each sewer extension, referring by number to the positions of said extensions upon the plans, to the State Department of Health, which extensions shall be immediately approved provided some progress shall have been made each year in the study of a comprehensive system of sewerage for the Cobbs Creek Drainage District, and provided that said sewer extensions shall as far as practicable conform to said comprehensive system.

THIRD: No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

Harrisburg, Pa., April 25th, 1907.

PHILADELPHIA, MAIN DELAWARE RIVER DISTRICT.

This approval of plans is given for the extensions of sewers in the Main Delaware River District of the city of Philadelphia, Philadelphia county, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State, in compliance with applications duly made and bearing date of March twenty-second, nineteen hundred and six; July ninth, Nineteen hundred and six; July thirty-first, nineteen hundred and six; September fourth, nineteen hundred and six; October ninth, nineteen hundred and six; November fifteenth, nineteen hundred and six; February twentieth, nineteen hundred and seven; April eleventh, nineteen hundred and seven, and on April thirteenth, nineteen hundred and seven.

It appears that these sewers are urgent and required for the maintenance of the health of the community and to permit the construction of a large number of buildings demanded by the increase of the population of the city.

The city of Philadelphia comprises the whole of Philadelphia county. It is bounded on the north by Montgomery county, on the east by Bucks county and the Delaware River, on the south by said river and on the west by Delaware county. The area so incorporated comprises one hundred and twenty-nine square miles. Poquessing Creek marks the division between the city and Bucks county on the east, and Darby and Cobbs Creek the division between the city and Delaware county on the west. The Schuylkill River coming down from the

anthracite coal fields and draining a populous water shed of over one thousand square miles, forms the westerly boundary of the Manayunk district of the city to the point where Wissahickon Creek joins the river from the east, whence its course is southerly and entirely within the limits of Philadelphia to its mouth, which is at a point near the southwesterly corner of the city. This stream is tidal for seven miles to Fairmount Dam. It is eight miles above this dam to the northerly limits of the Manayunk district, so the Schuylkill River passes by or through fifteen miles of city territory. Owing to the topography, its drainage area is narrow, and the river itself serves as the immediate channel for the contiguous territory until Wissahickon Creek is reached.

The district west of the Schuylkill is principally residential. More than one-half of it slopes to the river, and the remainder drains to Cobbs Creek, with the exception of the southern section which is largely marsh land subject to inundation.

The commercial part of the city lies in the peninsula east of the Schuylkill between it and the Delaware River. About two-thirds of this area sheds its drainage to the Delaware River. The southern part of this tract is also subject to flood at high water. The Delaware indirectly drains all of the city territory east of the Schuylkill water shed. There is a large area passing up stream as far as Frankford Creek and between Frankford Creek and Pennypack Creek which drains directly to the river.

The populous Germantown district and Frankford district of the city are in the immediate valley of Frankford Creek.

The Pennypack Creek which is three miles farther up stream, traverses a rural country excepting the last mile and a half of its course, but the Popuessing Creek valley is entirely suburban and most rural in character. Excepting it and the Wissahickon, the streams mentioned received large volumes of sewage discharged therein by city sewers.

The sewer extensions herein considered lie within the Main Delaware River District.

In eighteen hundred and eighty-four, after an extensive investigation, a comprehensive plan for modernizing the sewer system of the city was adopted. This system referred more particularly to improvements and the sanitary development of the Schulykill, Frankford, Pennypack and Cobbs Creek drainage districts. Since then it has been found necessary at various times to revise the plan. The drainage of the lowland in the southern section of the city between the Schuylkill and Delaware Rivers, afforded by public works, renders this land, which would otherwise be flooded, of great usefulness. Several sewer systems have been planned and partially constructed here whose outlets are into the river. All sewers in the main Delaware district discharge into the river. The question of the propriety of so doing as a permanent disposal has been briefly discussed by the municipal authorities on several occasions and then indefinitely postponed because while eventually an intercepting sewer may be demanded along the Delaware River, the necessity is more remote than for the intercepting systems in the other drainage districts of the city, and there is not money enough available to carry on such improvements everywhere. Precedence must be in order of importance.

On January first, nineteen hundred and six, there were ten hundred and forty-one miles of sewers in the city of which eighty per cent. were built under modern methods and conditions. Many of the older sewers are to be found in the Delaware drainage district. The Cohocksink system of old sewers is one of the most important and extensive. Renewal of portions of defective and inadequate parts of this system has been going on for years and will be continued until the worn out and dangerous parts have been entirely eliminated.

Between League Island and Frankford Creek along the banks of the Delaware River in Philadelphia, a distance of twelve miles there are twenty-three combined sewer outlets ranging in size from six to twelve by eighteen feet in diameter, by means of which the drainage from the commercial district of the city and all the territory in the Delaware drainage district is collected and discharged into the river.

The plans submitted and the lists accompanying them comprise extensions to the existing sewers in the Main Delaware Drainage District of a total of one hundred and twenty-two thousand and thirty feet of combined sewers whose sizes range from one and twenty-five-hundredths to seven feet in diameter, of which fifty-two thousand six hundred and twenty-four feet were designated in the list forwarded on March twenty-second, nineteen hundred and six; ten thousand five hundred and sixty-seven feet in the list of July ninth; ten thousand four hundred and forty-one feet in the list of July thirty-first; nine hundred and fifty-four feet in the list of September fourth; six thousand seven hundred and thirty-nine feet in the list of October ninth; one thousand two hundred and ninety-seven feet in the list of November fifteenth, nineteen hundred and six; ten thousand and fourteen feet in the list of February twentieth, nineteen hundred and seven; one thousand eight hundred and ninety-three feet in the list of April eleventh; and twenty-six thousand five hundred and one feet in the list forwarded on April thirteenth, Nineteen hundred and seven.

Opposite the city of Philadelphia, in New Jersey, Camden, Gloucester, Stockton and other places are discharging sewage into the river. It is estimated that New Jersey contributes upwards of twenty-five million gallons of sewage daily to the Delaware River, and that Pennsylvania contributes nine times as much more sewage, so that probably two hundred and fifty million gallons of sewage daily pass a point in the Delaware River immediately below the mouth of the Schuylkill. Here the least average monthly flow in the streams is one billion two hundred and eighty-three million gallons daily. So it appears that during periods of low flow in the summer time, the outward movement of fresh inland water is but five times greater in volume than the volume of sewage; in other words, the flow comprises one part sewage to five parts fresh river water.

The Commissioner of Health of the states of New York and Pennsylvania have had consultations with the State Sewerage Commission of New Jersey with respect to a joint sanitary policy to conserve the water supplies and preserve the purity of the streams in the territory of these three sovereign states lying within the Delaware River watershed. More than forty-four per cent. of New Jersey's territory and over twenty-one per cent. of its population are included in the basin. Many important interests, such as riparian land values, large shad and other fisheries, including shell fish industries and public water supplies, are involved, rendering the problem peculiarly an inter-state one. A policy of co-operation has been inaugurated which assures good results if its integrity be maintained. The co-operation of the municipal authorities of Philadelphia is very essential to the ultimate success of the plan. It would not be sound public policy for the State authorities to jointly stop the pollution of the Delaware River and the Schuylkill River and their tributaries above Philadelphia and ignore the present method of disposal of sewage in the city. Improvements in the method of disposal are demanded at the mouth of Pennypack Creek because the sewage there is an immediate menace to Philadelphia's water supply taken from the river at Torresdale; at the mouth of Frankford Creek and in this creek above its mouth because an intolerable nuisance results from the pollution of the stream, and because the sewage menaces and pollutes the city water supply taken from the Lardner street pumping station in the vicinity; along the Schuylkill River because a nuisance therein exists; and the citizens of the town can see where benefits will accrue to the city at large by discontinuance of sewage outlets along its bank; and along Cobbs Creek because a nuisance therein exists and a parkway could not be maintained there unless the benefits of intercepting of the sewage were brought about. All these things are being contemplated by the city and should be carried out, but the plans should be adapted to a future method of disposal, and the city can perform its part of co-operating with the State to bring about prevention of the pollution of the stream by filing with the State a plan or plans for the collection of all of the sewage of the city. It is not to be expected that such a plan will be carried out in its entirety for a great many years, but the policy should be outlined and agreed upon in all fairness to the other municipalities in the water shed in the states of New Jersey and Pennsylvania, as well as to the taxpayers of the city.

This plan does not relate to the re-building of branch sewers and sewers built by private individuals. In the district under discussion, many of the city's important highways are too narrow to accommodate public structures beneath the surface. Even the Bureau of Filtration has found it difficult to find available space in streets to accommodate the necessary mains of the new water supply system. The present conditions of sewerage cannot be improved in built up sections of the city, except at an enormous expense which render the cost prohibitive. But it is entirely possible and feasible for a plan to be devised and adopted by the city and State whereby the dry weather flow of all the city sewers will be taken out of the streams and conveyed to the ultimate site or sites for disposal and whereby storm water will not be so conveyed, but will be permitted to overflow into the nearby water courses under conditions that will obviate any nuisance being created.

In view of these and other considerations, it has been unanimously agreed by the Governor, Attorney General and Commissioner of Health that the interests of the public health demand that approval be given and it is hereby and herein given for the extension of sewers in the Main Delaware River District as designated by the above mentioned lists and plans forwarded under the several dates given, under the following conditions and stipulations:

FIRST: That the city shall, on or before the year nineteen hundred and twelve, prepare and submit to the State Department of Health for approval, a plan for the collection and disposal of the sewage of the entire Main Delaware River District.

SECOND: The city shall in the interim forward plans and lists of sewers authorized to be built by councils of the city, from time to time, giving the name, size, length of each sewer extension, referring by number to the positions of said extensions upon the plans, to the State Department of Health, which extensions shall be immediately approved provided some progress shall have been made each year on the comprehensive plan for the entire district.

THIRD: No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

Harrisburg, Pa., April 25th, 1907.

PHILADELPHIA, SCHUYLKILL RIVER DRAINAGE DISTRICT.

This approval of plans is given for the extension of sewers in the Schuylkill River drainage district of the city of Philadelphia, county of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State, in compliance with applications duly made and bearing date of March twenty-seventh, one thousand nine hundred and six, June twenty-eighth, one thousand nine hundred and six, July ninth, one thousand nine hundred and six, July thirty-first, one thousand nine hundred and six, September fourth, one thousand nine hundred and six, September eighteenth, one thousand nine hundred and six, October ninth, one thousand nine hundred and six, November fifteenth, one thousand nine hundred and six, February twentieth, one thousand nine hundred and seven and on April eleventh, one thousand nine hundred and seven.

It appears that these sewers are urgent and required for the maintenance of the health of the community and to permit the construction of a large number of buildings demanded by the increase of the population of the city.

The city of Philadelphia comprises the whole of Philadelphia county. It is bounded on the north by Montgomery county, on the east by Bucks county and the Delaware River, on the south by said river and on the west by Delaware county. The area so incorporated comprises one hundred and twenty-nine square miles. Poquessing Creek marks the division between the city and Bucks county on the east, and Darby and Cobbs Creek the division between the city and Delaware county on the west. The Schuylkill River coming down from the anthracite coal fields and draining a populous watershed of over one thousand square miles, forms the westerly boundary of the Manayunk district of the city to the point where Wissahickon Creek joins the river from the east, whence its course is southerly and entirely within the limits of Philadelphia to its mouth, which is at a point near the southwesterly corner of the city. This stream is tidal for seven miles to Fairmount dam. It is eight miles above this dam to the northerly limits of the Manayunk district, so the Schuylkill River passes by or through fifteen miles of city territory. Owing to the topography, its drainage area is narrow, and the river itself serves as the immediate channel for the contiguous territory until Wissahickon Creek is reached.

The district west of the Schuylkill is principally residential. More than one-half of it slopes to the river, and the remainder drains to Cobbs Creek, with the exception of the southern section which is largely marsh land subject to inundation.

The commercial part of the city lies in the peninsula east of the Schuylkill between it and the Delaware River. About two-thirds of this area sheds its drainage to the Delaware River. The southern part of this tract is also subject to flood at high water. The Delaware indirectly drains all of the city territory east of the Schuylkill watershed. There is a large area passing up stream as far as Frankford Creek, and between Frankford Creek and Pennypack Creek which directly drains to the river.

The populous Germantown district and Frankford district of the city are in the immediate valley of Frankford Creek.

The Pennypack Creek which is three miles farther up stream traverses a rural country excepting the last mile and a half of its course, but the Poquessing Creek valley is entirely suburban and most rural in character. Excepting it and Wissahickon, the streams mentioned receive large volumes of sewage discharged therein by city sewers.

The sewer extensions herein considered lie wholly within the Schuylkill River drainage district.

All of the sewers in the district discharge into the river below Fairmount dam. The stream is tidal and navigable up to this dam.

On the east side of the river there are ten sewer outlets whose diameters range from four to thirteen feet. They are all combined sewers with the exception of the four foot sewer immediately below the dam which is known as the main intercepter. This takes house drainage only from the Schuylkill water shed on the east side above Fairmount Dam. On the west side of the river there are seven sewer outlets, each discharging combind sewage and storm water, the largest having a diameter of twenty feet, it being the trunk for the Mill Creek system. Four of these outlets discharge indirectly into the river through open water coures, so it appears. The city's plan for improved sewerage shows the contemplation of the substitution of masonry conduits for the open natural channels.

The district of West Philadelphia contiguous to the river, above the dam as far as Girard Avenue is served by the Mantua Creek outfall sewer which is nine feet in diameter and delivers the drainage of the system into the river immediately below the dam.

Above Girard Avenue, Fairmount Park comprises all the land along the river to the city line.

The work of constructing the main intercepting sewer was begun in one thousand eight hundred and eighty-three, and has since been carried on yearly by means of comparatively small appropriations. At present it serves the territory comprising Manayunk, Roxborough, Chestnut Hill, portions of Germantown, Falls of Schuylkill and a part of the Thirty-eighth Ward. The main line from Wissahickon Creek down receives the drainage from Falls of Schuylkill and the Thirty-eighth Ward area. Above the main line, the intercepting system is divided by the topography, one branch being known as the Wissahickon valley intercepting sewer, and the other, along the river, being named the Manayunk intercepting sewer. As originally designed, the main intercepter was not intended to be the trunk for the entire district. The plan included a high level relief intercepter which should carry the sewage of Chestnut Hill and Western Germantown from the Wissahickon water shed by tunnel through the divide, between the Schuylkill and Delaware basins and discharge it into sewers having outfalls into the Delaware River. However, the first appropriation for this Wissahickon high level cut-off sewer was not made until three years ago. The improvement is extensive and the work will be done gradually as the money is forthcoming. Meantime, the main intercepter will be subject to surcharge and overflow and that portion of the city's water supply taken from the Schuylkill River above the dam will be menaced thereby.

Relative to proposed sewers, the plans submitted and the list accompanying them comprise extensions to the existing sewers in the Manayunk district of a total of twenty-five thousand nine hundred and sixty-five feet of sewers receiving house drainage only, sizes ranging from eight inches to two and twenty-five-hundredths feet in diameter, of which seventeen thousand two hundred and twenty-five feet were designated in the list forwarded on March twenty-second, one thousand nine hundred and six and two thousand nine hundred and forty feet in the list of October ninth, one thousand nine hundred and six, and five thousand eight hundred feet in the list forwarded February twentieth, one thousand nine hundred and seven. In the Wissahickon district, the plans submitted and the lists accompanying them comprise extensions to the existing sewers of a total of twenty-seven thousand five hundred and fifty-four feet of separate sewers, the largest of which is five and twenty-five-hundredths feet in diameter, of which two thousand nine hundred and twenty-four feet were designated in the list forwarded on March twenty-second, one thousand nine hundred and six and sixteen hundred and sixty feet in the list of July ninth, one thousand nine hundred and six and nine hundred and eighty-five feet in the list forwarded April eleventh, on thousand nine hundred and seven.

For the district immediately tributary to the main intercepter, the plans submitted and the lists accompanying them show extensions to the existing sewers of a total of nineteen hundred, three hundred and forty-seven feet of separate sewers, whose diameters range from ten inches to four and five-tenths feet, of which two thousand seven hundred and twenty feet were designated in the list forwarded March twenty-second, one thousand nine hundred and six, one thousand three hundred and fifty feet in the list of July ninth and two hundred and sixty feet in the list of October ninth, one thousand nine hundred and six and thirteen thousand two hundred and sixty feet in the list of February twentieth, one thousand nine hundred and seven and one thousand seven hundred and fifty-seven feet in the list forwarded on April eleventh, one thousand nine hundred and seven.

Below the dam on the east side of the river, the extensions to the existing sewers, which are wholly combined, as shown by the plans and lists accompanying them, comprise a total of twenty thousand and ninety-one feet, of which seven thousand three hundred and fourteen feet were designated in the list forwarded on March twenty-second, one thousand nine hundred and six, four thousand one hundred and eighty feet in the list of July ninth, four hundred and fifty feet in the list of July thirty-first, two hundred and forty feet in the list of September fourth, four hundred and fifty feet in the list of September eighteenth, four hundred and thirty feet in the list of October ninth, thirteen hundred and fifty feet in the list of November fifteenth, one thousand nine hundred and six, two thousand two hundred and thirty feet in the list of February twentieth, one thousand nine hundred and seven and three thousand four hundred and forty-seven feet in the list forwarded on April eleventh, one thousand nine hundred and seven. One only of the above combined sewers calls for a new outlet. It is three feet in diameter and is laid to the river at the foot of Race Street. The largest extension is seven and five-tenths feet in diameter.

Below the dam on the west side of the river, the extensions to the existing sewers, which are wholly combined, as shown by the plans and lists accompanying them, comprise a total of sixty-six thousand three hundred and nine

feet, the largest of which is six and twenty-five-hundredths feet in diameter, of which thirty-two thousand seven hundred and thirty feet were designated in the list forwarded on March twenty-second, one thousand nine hundred and six, five hundred and forty-eight feet in the list if June twenty-eighth, eleven thousand four hundred and thirty eight feet in the list of July ninth, four hundred and ninety six feet in the list of July thirty-first, two thousand eight hundred and eighty feet in the list of September fourth, three thousand five hundred and twenty-one feet in the list of September eighteenth, two thousand one hundred and sixty-three feet in the list of October ninth, one thousand nine hundred and six, five thousand four hundred and forty-three in the list of February twentieth, one thousand nine hundred and seven and seven thousand and ninety feet in the list forwarded on April eleventh, one thousand nine hundred and seven.

Undoubtedly, the notable riverside drive extending along the Schuylkill and up the valley of the Wissahickon has contributed towards popularizing the reclamation of these streams from sewage pollution. This restoration, so far as the city could bring it about, has been materially hastened by the adoption of the separate system of sewerage for the district, whereby storm water is permitted to drain to the streams and house sewage and other deleterious liquids are intercepted and conveyed to the river below the dam. The extension of this work beyond the confines of the municipality by the State Department of Health, is being vigorously pushed from the standpoint of public health.

The Wissahickon rises in Montgomery County about twelve miles north of the city line, and on its banks are the boroughs of North Wales and Ambler which contribute somewhat to the pollution of the stream. The State officers are now engaged in removing every menace here and also in the entire county which lies wholly within the Schuylkill basin. Special attention is being given to the matter of sewage disposal in every incorporated municipality on the entire Schuylkill water shed, and much will be accomplished during the next few years with respect to the discontinuance of the discharge of sewage into the river and its tributaries. Through the operation of the authorities of the City of Reading and the State Department of Health, modern works are now being erected for the purification of the entire sewage of the city.

So long as Philadelphia shall continue to derive a portion of its water supply from the Schuylkill River, the interests of the public health will demand that sewage pollution of the water be prevented. It is, therefore, gratifying from the State's standpoint, to note the progress which the city is annually making to safeguard its own supply. The Bureau of Health is compelling property owners on the intercepting area to make sewer connections and rearrange existing house drainage to exclude roof and yard storm water from the sewers. Owners of estates remotely located on the area are prevented from anticipating or demanding a sewer in the near future by regulations of councils providing for the disposal of sewage in some other way than into the stream. In its effort to keep pace with the sanitary demands of the district, the city has extended the Manayunk intercepter to take drainage from the sand washers at the upper and lower Roxborough filtration plants.

In West Philadelphia it appears that main sewers are necessary to assure sanitary conditions in large tracts that are being opened up and developed. The city's policy in this respect is materially aiding the development of its suburbs. The question of the pollution of the Schuylkill River below the dam is more particularly the question of a nuisance. The foul appearance of the river, and the strong odors emanating from the putrefaction of accumulated deposits therein, renders remedial measures advisable. Rapid development of land in the vicinity of League Island, and the project for a boulevard on either side of the river, emphasizes the importance of bestowing something more than a passing thought to the subject of sewerage improvements. It appears that preliminary studies for intercepting sewers on both sides of the Schuylkill River to the lowlands near its mouth have been made. The benefits of such sewers will accrue largely to the city. How soon it shall be done, is primarily a matter for municipal consideration like any other nuisance question within its territory; but when such sewers are built, the subject of final disposal of the sewage must be given proper consideration. And a comprehensive plan should be laid down to the mutual satisfaction of the city and State authorities.

In view of these and other considerations, it has been unanimously agreed by the Governor, Attorney General and Commissioner of Health, that the interests of the public health demand that approval be given and it is hereby and herein given to the plans submitted by the city for the extension of sewers in the Schuylkill River drainage district in conformity with the lists forwarded on the several dates hereinbefore given under the following conditions and stipulations:

FIRST: That the city shall on or before the year one thousand nine hundred and twelve prepare and submit to the State Department of Health for approval a comprehensive sewerage plan for the collection and disposal of the sewage of the entire Schuylkill River drainage system.

SECOND: The city shall, in the interim, forward plans and lists of sewers authorized to be built by councils of the city from time to time, giving the name size and length of each sewer extension, referring by number to the positions of said extensions upon the plans, to the State Department of Health, which extensions shall be immediately approved provided some progress shall be made each year in the study of a comprehensive system of sewerage for the entire Schuylkill River drainage system and provided that said sewer extensions shall as far as practicable conform to the said comprehensive system.

THIRD: No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

Harrisburg, Pa., April 25th, 1907.

CITY OF PHILADELPHIA.

This approval of plans is given for the extension of sewers in the Main Delaware River Drainage District, in the Schuylkill River Drainage District and in the Frankford Creek Drainage District of the City of Philadelphia, County of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State in compliance with applications duly made and bearing date of April eighteenth nineteen hundred and seven, under the conditions and stipulations set forth in three communications dated April twenty-ninth, nineteen hundred and seven, addressed to Hon. John E. Reyburn, Mayor of Philadelphia, and entitled, "APPROVAL OF SEWER EXTENSIONS IN FRANKFORD CREEK DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT" AND " APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT," copies of which are as follows:

APPROVAL OF SEWER EXTENSIONS IN FRANKFORD CREEK DRAINAGE DISTRICT.

Harrisburg, Pa., April 29th, 1907.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 23rd, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Frankford Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Frankford Creek drainage district, designated in the list and the plan accompanying them dated April 18th, 1907. Said list comprises a total extension of fourteen hundred and forty feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT.

Harrisburg, Pa., April 29th, 1907.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Main Delaware River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Main Delaware River drainage district, designated in the list and the plan accompanying them dated April 18th, 1907. Said list comprises a total extension of seven hundred and sixty-seven feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT.

Harrisburg, Pa., April 29th, 1907.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in

the Schuylkill River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Schuylkill River drainage district, designated in the list and the plan accompanying them dated April 18th, 1907. Said list comprises a total extension of twenty-five hundred and seventy feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

This permit shall be recorded in the office of the Recorder of Deeds for Philadelphia County.

Harrisburg, Pa., May 7th, 1907.

CITY OF PHILADELPHIA.

This approval of plans for the extension of sewers in the Frankford Creek Drainage District, in the Main Delaware River Drainage District, in the Schuylkill River Drainage District and in the Cobbs Creek Drainage District of the City of Philadelphia, County of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State is given in compliance with an application duly made and bearing date of May twenty-first, one thousand nine hundred and seven, under conditions and stipulations set forth in four communications dated May thirty-first, one thousand nine hundred and seven, addressed to Hon. John E. Reyburn, Mayor of Philadelphia and entitled "APPROVAL OF SEWER EXTENSIONS IN FRANKFORD CREEK DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT" AND "APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT," copies of which are as follows:

APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT.

Harrisburg, Pa., May 31st, 1907.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 23rd, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Frankford Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Frankford Creek drainage district, designated in the list and the plan accompanying it dated May 21st, 1907. Said list comprises a total extension of nine hundred and fifty-five feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT.

Harrisburg, Pa., May 31st, 1907.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Main Delaware River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in the Main Delaware River drainage district, designated in the list and the plan accompanying it and dated May 21st, 1907. Said list comprises a total extension of eight hundred and twenty-seven feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT.

Harrisburg, Pa., May 31st, 1907.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in

the Schuylkill River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Schuylkill River drainage district, designated in the list and the plan accompanying it dated May 21st, 1907. Said list comprises a total extension of two thousand eight hundred and seventeen feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT.

Harrisburg, Pa., May 31st, 1907.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Cobbs Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Cobbs Creek drainage district, designated in the list and the plan accompanying it dated May 21st, 1907. Said list comprises a total extension of four hundred and ninety-four feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

This permit shall be recorded in the office of the Recorder of Deeds for Philadelphia County.

Harrisburg, Pa., June 10th, 1907.

CITY OF PHILADELPHIA.

This approval of plans given for the extension of sewers in the Frankford Creek Drainage District, in the Main Delaware River Drainage District, in the Schuylkill River Drainage District and in the Cobbs Creek Drainage District of the City of Philadelphia, County of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State in compliance with applications duly made and bearing date of September twenty-sixth, one thousand nine hundred and seven, under the conditions and stipulations set forth in four communications dated November thirteenth, one thousand nine hundred and seven, addressed to Hon. John E. Reyburn, Mayor of Philadelphia, and entitled, "APPROVAL OF SEWER EXTENSIONS IN FRANKFORD CREEK DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT" AND "APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT," copies of which are as follows:

APPROVAL OF SEWER EXTENSIONS IN FRANKFORD CREEK DRAINAGE DISTRICT.

Harrisburg, Pa., November 13th, 1907.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 23rd, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Frankford Creek Drainage District of the sewerage system of the city of Philadelphia, herein please find approval of sewer extensions in said Frankford Creek Drainage District, designated in the list and the plan accompanying it dated September 16, 1907, and forwarded to this Department on November 12th, 1907. Said list comprises a total extension of six hundred and ninety feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT.

Harrisburg, Pa., November 13th, 1907.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in

the Main Delaware River Drainage District of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in the Main Delaware River Drainage District, designated in the list and the plan accompanying it, and dated September 16th, 1907, and forwarded to this Department on November 12th, 1907. Said list comprises a total extension of one thousand four hundred and seventy feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT.

Harrisburg, Pa., November 13th, 1907.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Schuylkill River Drainage District of the sewer system of the city of Philadelphia, herein please find approval of sewer extensions in said Schuylkill River Drainage District, designated in the list and the plan accompanying it dated September 16th, 1907, and forwarded to this Department on November 12th, 1907. Said list comprises a total extension of four thousand three hundred and ninety-two feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT.

Harrisburg, Pa., November 13th, 1907.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Cobbs Creek Drainage District of the sewerage system of the city of Philadelphia, herein please find approval of said sewer extensions in said Cobbs Creek Drainage District, designated in the list and the plan accompanying it dated September 16th, 1907, and forwarded to this Department on November 12th, 1907. Said list comprises a total extension of three thousand one hundred and ninety feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

This permit shall be recorded in the office of the Recorder of Deeds for Philadelphia County.

Harrisburg, Pa., November 13th, 1907.

PITCAIRN, ALLEGHENY COUNTY.

This application was made by the borough of Pitcairn, Allegheny County, and is for permission to extend the sewer system and to discharge the sewage therefrom into Turtle Creek.

It appears that the borough of Pitcairn is purely a residential community of between five and six thousand population, located in Turtle Creek valley and on the north side of the creek and entirely surrounded by Patton Township. The strip of township land separating the southwestern portion of the borough from the creek is at one place only about one hundred feet wide. Pitcairn station is on the opposite side of Turtle Creek, in North Versailles Township, on the main line of the Pennsylvania Railroad, fifteen and four-tenths miles east of Pittsburg. It is here in the township that the Pennsylvania Railroad repair shops and yards are located, where are employed between fifteen and eighteen hundred hands, many of whom reside in Pitcairn borough. The town's population in the year nineteen hundred, was two thousand six hundred and one, and to all appearances it is rapidly increasing now.

The extreme southwestern part of the town west of Centre Avenue lies comparatively flat, but the northern and eastern portions of the borough are hilly, in some cases steep grades reaching fifteen per cent. A number of the streets are paved with brick and have permanent sidewalks and appearances indicate generally thrift and prosperity.

The borough is intersected by two runs, which form natural drainage channels for surface water. The one to the west rises about three miles to the north, near Monroeville village in Patton Township, and comes down

through a deep, narrow ravine emerging onto the flats in the borough in the southwestern part of Pitcairn near Centre Avenue. The other rises in or near the eastern boundary of the borough and drains the eastern portion of the town. Both empty into Turtle Creek. The water supply is furnished by the Pennsylvania Water Company from filter cribs in the Allegheny River and from an emergency connection in the Monongahela River. Both sources are polluted with sewage. It is reported that there are a number of bored wells in town, some of which are thought to be polluted. There are also a few springs on the outskirts, which are used to a limited extent. The local health authorities are reported to hold to the view that none of the private wells are safe to use as a source of drinking water, owing to the saturation of the soil by seepage from privies and cesspools that were in existence before the construction of the sewer system. Some of these cesspools and privies are still in use.

The Pitcairn shops of the Pennsylvania Railroad Company furnish their employes with water obtained by the railroad company from Indian Creek near Uniontown. The supply is said to be pure and free from contamination as revealed by more or less frequent examination by the chemists of said company. The shops also have a connection to the water works system of the Pennsylvania Water Company for emergency uses.

At the plant of the Van Ormer Brick Company, west of and adjacent to the borough, water is used from the Pennsylvania Water Company and also from two springs. One of these is located some distance back on a hill. Men employed in the quarry and in the coal mine of the brick company drink from this spring. It is reported that there are no houses or other permanent sources of contamination above it. The other spring is located west of the plant below and within fifty yards of houses occupied by the poorer class of laborers, apparently foreigners. The spring is walled up to the surface of the ground and partly covered with a stone slab. It would appear liable to receive surface drainage and other pollution, and should be considered a dangerous source of drinking water for human beings.

The object of a sewerage system is to remove poisonous matters from the vicinity of human habitation before it can have time to do injury, and in sanctioning a sewerage project, the facilities afforded by the plan for bringing these benefits of all the inhabitants should be considered. Some indication of whether this has been done and whether sewage is properly disposed of may be found in the typhoid fever records of the town. In the year nineteen hundred and five, there were nine cases and in the year nineteen hundred and six, twenty-six cases, and up to August first, nineteen hundred and seven, three cases which have been found on canvass by representatives of the Department to have occurred in the borough. Before the Indian Creek water was available at the Pennsylvania shops, the men used water from certain wells and one spring in the borough. The waters from these sources were examined and condemned by the Company's chemists and the spring was filled up and cemented and put entirely out of commission.

The public sewers are practically on the separate system, comprise a total of about five miles, of which about three miles consist of eight inch pipe, one mile of ten inch, one-half mile of twelve inch, sixteen hundred feet of fifteen inch and one thousand feet of twenty-four inch, which serves as the outlet and empties into Turtle Creek in the narrow strip of Patton township opposite the southwestern part of the borough. This outlet is a few hundred feet below and opposite a privy overhanging the creek at the railroad shops. In addition to the discharge from the borough sewers, Turtle Creek receives sewage from a private sewer or two pipes from the railroad shops and also from one or more sewers in the borough of Wall. The Pitcairn system takes a small amount of surface drainage at the corner of Broadway and Centre avenue and also roof water from about seventy-five houses.

The petitioners have mentioned in the application an extension on Twelfth street of two hundred and forty-five feet of eight inch pipe, which it is desirable to have made to relieve a nuisance arising from kitchen waste which now finds its way to the street gutter, but it appears that the local authorities also desire, as expressed to the Department's representative, to lay sewers on Hill Side avenue and on Broadway in order to abate nuisances there and to make other extensions from time to time of the sewer system as laid out in a comprehensive manner for the entire borough and first installed in nineteen hundred and one, since which date additions have been made in conformity therewith.

In addition to sewage from Pitcairn, Turtle Creek and its tributaries receive sewage from the boroughs of Jeannette, Irwin, Trafford City, Wall, Wilmerding, Turtle Creek and East Pittsburg, having an aggregate population of thirty thousand or more.

About four and one-half miles below the borough, Turtle Creek flows into the Monongahela River. The borough of Homestead is reported to take water for public uses in emergencies from a point in the river about three miles below the mouth of Turtle Creek. Below Pitcairn no use is made of Turtle Creek water except for cooling, condensing and manufacturing purposes, at the ex-

tensive industrial plant of the Westinghouse Air Brake Company at Wilmerding and the Westinghouse Electric and Manufacturing Company, and the Westinghouse Machine Company at East Pittsburg.

During dry weather in summer it is estimated that at least one-third of the volume of the flow of the creek is acid mine drainage. Undoubtedly, the effect of this sulphur water upon the sewage in the creek is germicidal to some extent and this mitigates against a nuisance in the stream. Nevertheless, there is a limit to this effect and in event of the valley of Turtle Creek becoming thickly populated as a residential section to which present indications strongly point, and no attempt be made to plan for some other disposal than into the creek, it is a matter of a comparatively short time only when a nuisance would be created and prudence and the public health demand that plans be outlined and gradually be carried out as the valley develops, to obviate the establishment of any nuisance in the creek. This means that ultimately all the sewage must be treated.

The municipalities bordering the Ohio River must look to that stream as a source for their drinking water, and the general interests of the public health demand that the waters shall be reasonably protected from pollution. This is another reason why the borough of Pitcairn should have its attention called to the necessity of planning for the purification of its sewage. It is reported that the assessed valuation of the borough is two million ninety-eight thousand dollars, and that the present bonded debt is fifty-three thousand dollars. An increase in the indebtedness has been authorized to the extent of twenty thousand dollars to pay for new pavements, sewer extensions and other municipal improvements. So that the borrowing capacity is therefore in the vicinity of seventy thousand dollars. This would be a sufficient sum to pay for the cost of erecting a sewage purification plant, there being an available site for such works in the township in the neighborhood of the present sewer outlet. But the necessity of compelling this borough to assume the cost of investments in such works and the annual charge thereafter for operation in advance of other municipalities and private corporations now discharging their sewage into the creek does not appear, more especially since it is possible that the project in Turtle Creek valley of a joint intercepting sewer and one disposal plant for the boroughs and parts of townships in the district may be the most satisfactory solution of the problem for all concerned.

Since borough ordinances provide for modern facilities in dwellings and it is the policy of the borough to provide sewerage facilities and since a comprehensive system of sanitary sewerage was adopted several years ago and has been conformed to, it appears to be in the interests of public health to grant permission to continue this policy and to extend sewers from time to time as necessity may require.

It has been determined that the interests of the public health demand that approval be given, and it is hereby and herein given for the extensions of the sanitary sewer system and for discharge of sewage therefrom into Turtle Creek, and a permit is granted therefor under the following conditions and stipulations:

FIRST: That storm water shall be excluded from the system, except it can be proved that such admission is necessary for flushing the sewers and that it does not interfere with or injure the operation of the sewerage system or of disposal works that may be installed at any time.

SECOND: Inspection manholes shall be placed at changes in line and grade of sewers, careful records shall be kept of all connections with the system and a copy thereof furnished to the State Department of Health when required, and at the close of each season's work, plans and profiles of the sewers built during the year, together with any other information in relation thereto which may be desired shall be filed with the State Department of Health.

THIRD: If for any reason the sewer system or any part thereof be found to be unsanitary or injurious to the public health, in the opinion of the Commissioner of Health, then such remedial measures shall be adopted as said Commissioner may advise or approve.

FOURTH: No pathological material from any laboratory shall be permitted to be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

FIFTH: This permit to discharge sewage into the waters of the State shall cease on the first day of June, one thousand nine hundred and eight; but if the borough shall have complied with the conditions of this permit, and, on or before said first day of June, shall have prepared and submitted for approval a plan for the interception of the sewage at its present outlet and for the treatment of said sewage either independently or in conjunction with other municipalities, then the Commissioner of Health may extend the time in which raw sewage may be discharged into the waters of the State.

The borough is advised that several municipalities in Turtle Creek valley have applied for permission to extend sewers and that the Department will be glad to co-operate and advise with respect to sewage purification works and with special reference to the ultimate discontinuance of the discharge of sewage into Turtle Creek by a joint sewerage project.

Furthermore the borough authorities should have a systematic test made of springs and wells within the municipal territory and promptly put out of commission any well or spring found contaminated, or so located that precautions against contaminations having been taken, the source would still continue to be suspicious.

The Brick Company will be requested to test the spring water and, if found polluted, to condemn it and close up the spring, and, in any event, to take all precautions necessary to prevent surface and sub-soil pollution.

Harrisburg, Pa., November 2nd, 1907.

PITTSBURG, ALLEGHENY COUNTY.

This application was made by the city of Pittsburg and is for approval of plans for the disposal of sewage at the Pittsburg Filtration Works, said plans comprising sheets number one hundred and two M, one hundred and five L, eight F, ninety-nine A, forty J, forty K, and one hundred and fifty-three Y.

It appears that the city of Pittsburg is located on the land lying at the fork of the Allegheny and Monongahela Rivers where they unite to form the Ohio River. The water supply has always been derived from the turbid and sewage polluted waters of the Allegheny, taken at a point over five miles above the Monongahela, known as Brilliant, where is located the pumping station which rises the water into the city. Opposite the Brilliant pumping station and just above it on the north bank of the river is a level plateau over a mile long and about a half mile wide whose level is higher than the highest freshet ever recorded. Here a slow sand filtration plant is being built to treat the entire water supply of Pittsburg and possibly the Greater Pittsburg district. The plant consists of a pumping station, sedimentation basins, fort-six acres of covered filter beds each an acre in area, filter water basins and gravity supply mains under the river to the pumping engines in the Brilliant pump house. It will have a net daily capacity of one hundred million gallons, based on a maximum rate of filtration of three million gallons per acre per twenty-four hours, making allowances for cleaning and other operations. The works are designated for future additions, space having been reserved therefore, in the western portion of the tract owned by the city.

The contracts for the entire system were let in March nineteen hundred and five. Their completion will be acomplished during the first part of nineteen hundred and eight. The site is in O'Hara Township, Allegheny County, and is bounded on the west by Aspinwall borough. Through this borough there were formerly a natural water course now confined to a forty-eight inch circular brick drain, built partly by the city of Pittsburg and partly by private enterprise, which receives the storm flow of a portion of the territory upon which the city is erecting its filter plant. This drain will also take some of the drainage water from the filters.

As soon as it became known that this drain might be made the outlet for the sewage of a large ultimate population in the borough of Aspinwall, the city authorities interposed objections to the use of the drain as the carrier of any sewage whatever, unless the outlet be continued along the river bank below the Government dam in the river.

The main drain for the water filtration plant is into the Allegheny River above the Brilliant pumping station and below the filter pumping station. It is to take storm drainage from a considerable area and also waste water from the sand washes and sedimentation basin of the filter plant. While this waste will not be more objectionable than the pollution in the river water into which it is proposed to discharge the drain permanently, nevertheless, it will constitute ultimately a material pollution to the river at a point above thirteen hundred feet above the said forty-eight inch drain. Therefore, plans are now under advisement whereby the borough sewage is to be carried further down stream for ultimate treatment and whereby the waste water from the filter and sand washes is to be submitted to some kind of clarifying treatment. It is the treatment of domestic sewage from the buildings and sanitary facilities on the entire city property at the works which is now under consideration in this report. The sewage is to be purified by septic tanks and sand filters, and the effluent discharged into the Allegheny River.

At the upper end of the city tract are the new intakes and pumping plant by means of which the raw river water is to be raised into a central receiving basin, capacity twenty million gallons on either side of which are larger sedimentation basins from which the water is to pass to the filters. It is expected that a greater part of the suspended matter will be deposited in the primary receiving basin, hence it will be cleaned at comparatively short intervals. All three basins are designed to drain to sumps leading to the drainage system of the plant. The conduits carrying settled water from the basins lead to the central gate chamber at the primary receiving basin, although there is an eastern gate chamber and a western gate chamber located respectively at the remote ends of the large sedimentation basins. The

operation of the entire plant will be controlled and directed from the Administration Building erected over the central gate chamber. Here will be the officer's quarters, operating mechanism and bacteriological and chemical laboratories. A thoroughfare in which the three gate chambers are located extends east and west through the plant paralleling the river and separating the sedimentation basins, which are at the foot of the hills, from the filters which lie between it and the Freeport Road and the tracks of the West Penn Division of the Pennsylvania Railroad near the river bank.

Passing longitudinally through the site of the filters is a right of way in which the Allegheny City sixty inch rising main is laid. This strip sixteen feet wide is laid out as a driveway with grass plots on either side and divides the filter lay-out into north and south parts, three rows of filters being in each part. The distribution and collection system of pipes run at right angles to this driveway, placed in covered pipe galleries thirty-one feet wide in the clear between alternate rows of filters. There are four of these galleries in all, each about one thousand feet long, including the north and south part. All auxiliary apparatus and machinery for sand scraping, washing and restoring will be set up in them. There will be a fan heating system in each gallery to maintain a uniform temperature. A room is provided in each gallery for the attendant in charge. Toilet rooms for the attendants and laborers are to be provided in each half gallery, also a locker room and lunch room will be built. The floors of all of these rooms are to be tight, enclosed and arranged for ready cleaning.

Two sand washing tanks of concrete are to be placed in each half gallery. The flow of dirty water over the outlet weir of these washes is to pass directly into the drain under the floor of the gallery.

The present sewage output from the plant comes from the Superintendent's house and stable, the Administration Building, the toilet rooms in the galleries and the closets at the filter pump house.

The sewage from the Superintendent's house and stables is discharged into a six inch pipe connected to a fifteen inch drain which extends along the west property line and connects with the main drain directly south of Gallery No. One, which is the western gallery.

The sewage from the office and laboratories of the Administration Building discharges into a six inch cast iron drain connected to a twenty-four inch cast iron line into the gallery drain at Gallery No. Four which is the easterly one.

In each of the half galleries, making eight in all, there are sanitaries from which the sewage at present is designed to be discharged into the gallery drain. The drains are intercepted by a large main drain trunk along the Freeport Road which empties into the river almost directly south of Gallery No. One.

The sewage from the pumping station toilet rooms is at present discharged into a man-hole about twenty-five feet from the buildings which also takes drainage from the floor washings and seepage.

In order to prevent any polluting material from being discharged into the river, the following changes are proposed:

It is proposed to take the sewage from each of the several places to septic tanks and sand filters conveniently located and to discharge the effluent from the first three mentioned places into the main drain which empties into the river at the foot of Gallery No. One, and the purified effluent from the pumping station into the man-hole into which the sewage now discharges.

The Superintendent's house contains nine rooms, two bath rooms, a laundry and toilet room in the cellar. The stable, besides providing a storage room for vehicles and seven stalls for horses, has a large carriage room and boiler room, a harness room, five living rooms and a bath. It has been thought wise to be liberal in providing for the capacity of the plant, so it is estimated that from these buildings there will be an average of nineteen hundred gallons daily.

The general location of the two buildings is shown on Sheet No. eight F and the details of the septic tank and sand filter on Sheet No. one hundred and two M, one hundred and five L. A six inch tile pipe is to convey the sewage to the septic tank. This tank is designated to allow about twelve hours septic action, to deliver the effluent into storage tank, from which it will be let out upon the intermittent filter at convenient intervals by one of the attendants. The filtrate will pass through a six inch terra cotta drain into the drain in Gallery No. One. The filters are of the common intermittent type, having three feet of sand, resting on one foot of gravel, surrounded by light walls of concrete reinforced to take the earth pressure and covered by a reinforced concrete roof upon which roof there is to be two and a half feet of earth filling. The under-drainage of the filter consists of a four inch tile pipe with a portion of the bell cut off to allow it to lie flat upon the floor. These pipes are to be surrounded by twelve inches of graded gravel.

The principal object in covering the septic tank and sand filter is to hide them from public view, as this part of the plant is to be laid out as a public park. The general idea of landscape treatment of the entire water filter lay-

out is to isolate the site from the surroundings by hedges, to seed down the entire enclosure, lay out drives around and by the sedimentation basins, pump house and filters and relieve the formality of the view by shrubbery and small trees along the drive-ways.

To secure proper ventilation for the septic tank and filters thus hidden, some special means will be provided. Electric lights will be located to facilitate the operation of cleaning the filters.

The general location of the Administration Building is shown on Sheet No. eight F and the details of the septic tank and sand filter for it are shown on Sheet No. ninety-nine A. The sewage from this building is to be collected in a six inch cast iron pipe and conveyed thereby to the septic tank to be located in the roadway. This is designed for twelve hundred gallons of sewage, twelve hours septicization. A storage tank is provided for the effluent which will be delivered onto the sand filter by an attendant, the intermittent dosing to be at the rate of two hundred and fifty thousand gallons per acre daily. This filter is also provided with ventilation and electric lights. The filtrate is to discharge through a six inch terra cotta drain into the drain in Gallery No. Four.

The details of the gallery sanitaries are shown on Sheets Nos. forty J and forty K. As above noted they are now planned to discharge directly into the main gallery drain. It is proposed to break this connection and run the sewage into septic tanks, from which it will flow into a storage tank. After accumulated in this storage tank for a period, depending upon the amount of water used in the sanitaries (from six to twenty-four hours) the effluent will be drained off on to a sand filter.

The peculiar construction of this filter is made necessary by the condition of the galleries which will not permit it being placed any lower than shown. The filter and septic tank are to be covered by a platform of treated lumber. The other construction is similar to that shown for the septic tank for the Administration Building and the Superintendent's house. In the galleries there will be a fan operating continuously, blowing hot air at a pressure of one ounce into the gallery, and it is thought that this will give the necessary ventilation required for the septic tanks, openings being provided in the end of the filter and a vent pipe taken off from the septic tank through the gallery roof. The two wooden partitions shown at each end of the filter are for the purpose of baffling the air and bringing it down to the surface of the sand. The quantity of sewage to be taken care of in this filter will be extremely variable. The average rate of application is estimated at one hundred and fifty thousand gallons per acre, and the maximum two hundred and fifty thousand gallons per acre daily. There will be a septic tank and filter tank for each half gallery, or eight in all to dispose of the sewage from the gallery sanitaries.

The details of the septic tank and sand filter for the pumping station are shown on Sheet No. one hundred and fifty-three Y. It is planned to break the present connection to the man-hole and carry the sewage to a septic tank and sand filter similar in all respects to those above mentioned, with the exception that a storage tank will be provided to hold the filtrate for a period of two days. This storage will be used only at times when the river is flooded.

The care which the city has exercised in providing adequate facilities for the treatment and disposal of the sewage created at its water filter plant, is evidence of the sincerity of the municipal authorities' protest against the pollution of the Allegheny River by other municipalities.

It has been unanimously agreed that the interests of the public health demand that approval be given, and approval is hereby and herein given to the proposed plan and a permit granted for the construction thereof, under the following conditions and stipulations:

FIRST: That upon completion of the said plants herein approved, such reports of their operation shall be submitted to the State Department of Health from time to time as the Commissioner of Health may request.

SECOND: If at any time it may appear that the said sewage disposal plants need to be enlarged, repaired or improved then the city authorities shall, on advice of the Commissioner of Health, if this be necessary, make such repairs, alterations or extensions as the Commissioner of Health may approve.

THIRD: No pathological material from any laboratories shall be discharged into the sewer system. Such material shall be incinerated on the premises.

FOURTH: Weekly chemical and bacteriological reports of tests of sewage, septic effluent and the filtrate of each plant shall be made to and filed with the State Department of Health.

Harrisburg, Pa., April 29, 1907.

POLK, VENANGO COUNTY.

State Institution for Feeble Minded of Western Pennsylvania.

This application was made by the Board of Trustees of the State Institution for Feeble Minded of Western Pennsylvania, located at Polk, Venango County, and is for permission to construct improved sewerage, drainage and sewage disposal works.

On March fifteenth, One thousand nine hundred and seven, the Superintendent of the State Institution asked for advice with respect to sewerage improvements. Prior to that time a complaint had been made to the State Department of Health by the Board of Health of the borough of Polk, relative to a nuisance alleged to exist in said borough by reason of the discharge of sewage of the State Institution into the waters of North Sandy Creek.

It appears that Polk borough is in the central western part of Venango County, about eight miles west of Franklin, the county seat. Its entire population outside of the institution is about three hundred and fifty people.

It is bounded on the north by French Creek Township, on the east by said township, Sandy Creek and Victory Townships, on the south by Victory Township and Sandy Creek, and on the west by Mineral and French Creek Townships. The area incorporated comprises about six hundred acres, of which approximately two-thirds are included within the boundaries of the State Institution.

The district is drained by Big Sandy Creek, which flows southeasterly from the borough through a wooded country a distance of about eight miles to the Allegheny River, which it joins about eight miles below the city of Franklin. The stream forks in the eastern part of the borough, the branch from the north being known as North Sandy Creek, and the branch coming from the south-west, the largest one, being the main or Big Sandy Creek. The valley of the latter is from one-quarter to one-half mile wide, and of the former one-quarter of a mile wide, the ground on either side of the streams being quite rolling back to the top of the ridges elevated from one hundred and fifty feet to two hundred feet above.

The Big Sandy Creek has its source in Sandy Lake, near Stoneboro, in the eastern central portion of Mercer County, twelve miles west of Polk. This body of water is a local summer resort. Stoneboro is on its water shed. Formerly coal operations resulted in the pollution of Sandy Creek by sulphurous mine drainage whereby fish were killed, and the popularity of the resort imperiled. It is reported that this nuisance was obviated by the diverting of the mine drainage around the lake into the creek below. The acidity of this stream, therefore, is urged in support of the claim that no nuisance is created therein by the discharge of sewage from the State Hospital.

North Sandy Creek heads in the eastern part of Mercer County about six miles north-westerly from the borough of Polk, is principally fed by springs and during the wet season has an abundant flow which is reduced to a small amount in summer. The water shed of this branch is about twelve square miles. Springs on this water shed supply the Institution and the stream itself affords an emergency source.

The State property comprises ten hundred and ninety-one acres of ground in two separate tracts. The tract in the borough and immediately north of it through which North Sandy Creek flows has an area of about eight hundred and forty acres. The tract lying northwest and about one and a half miles distant from the main State Hospital buildings has an area of two hundred and fifty-one acres. This is north of North Sandy Creek and upon this tract are springs supplying the institution with water. Here also is located a farm house and two barns and a part of this tract is under cultivation.

The Hospital buildings were erected in eighteen hundred and ninety-five and eighteen hundred and ninety-six, and on April twenty-first, one thousand nine hundred and seven, there were one hundred and fifty-three inmates. On December first, one thousand nine hundred and six, there were twelve hundred and fifty inmates and about one hundred and fifty officers and attendants, making a total of fourteen hundred people connected with the institution.

The Hospital buildings are laid out on the cottage plan, facing the east on an eminence located in the northern central part of the borough. In front of the buildings at the foot of the slope, passing through the hospital grounds, is the Lake Shore and Michigan Southern Railroad. In the hills west of the buildings, Hibbs Run has its rise, various rivulets forming the run which comes down through the ravine north of the buildings, and turning southerly, enters North Sandy Creek opposite the Administration Building. Across this run has been erected a dam to facilitate the harvesting of ice for the institution. Immediately north of this pond is the main barn, but drainage from it is away from the pond. The fields tributary to it are partially wooded and partially cultivated. Extreme caution is taken to prevent any sewage pollution of this run above the pond.

The springs furnishing the supply to the institution are four in number. Each is enclosed in a stone structure about six feet square, roofed over and kept securely protected under lock and key. The water is piped from three of these springs into two masonry collecting reservoirs ten feet deep, twenty feet wide and forty feet long, which are also roofed over and securely protected by lock and key. These reservoirs are of sufficient elevation to deliver the water by gravity to an eight inch main to the main distributing reservoir on the hill just north of the main buildings and the borough line. The fourth spring is piped directly to this main. The main distributing reservoir is one hundred feet square, sixteen feet deep and has a capacity of one million two hundred thousand gallons. It is uncovered. From here the water is supplied by gravity to the buildings. The daily consumption varies between two hundred and fifty thousand and three hundred and fifty thousand gallons daily.

For a week, and possibly a month, during the summer the flow of the springs is inadequate, at which times water is pumped from North Sandy Creek into the eight inch main from the springs where it crosses the said creek.

Because the water shed of this stream is populated sparsely, there is an element of danger in the use of this water unless it be filtered. There are copious springs on lands adjacent to the two hundred and fifty-one acre tract elevated sufficiently to augment the present supply sufficiently to obviate any necessity for recourse to the creek, and it appears that negotiations are now pending towards securing this additional land.

It is reported that the exposure of the ground water to sunlight in the open reservoir has not caused the slightest noticeable deterioration in quality. Captain Wheelock reports most favorably on the healthfulness and sanitary conditions of the hospital and the entire institution.

There are two sewers at the institution. The main one is twenty-four inches in diameter and discharges into North Sandy Creek about one-eighth of a mile above its confluence with Big Sandy Creek. The other is eighteen inches in diameter and discharges into Big Sandy Creek at a point west of the railroad about one-third of a mile above North Sandy Creek. Both sewers take sewage and storm water. The smaller one serves the greenhouse and gardner's residence. The larger takes the sewage from all of the other institution buildings. Both outlets are without the State grounds. Complaints by the borough authorities are with respect to sewage from the larger outlet. There are several residences in the vicinity.

It appears that during the summer time when the flow of water in North Sandy Creek is very small, a considerable portion of this flow is sewage and consequently odors therefrom are pronounced in the vicinity and along the stream below. Cattle are pastured in the fields here, and drink the water in the creek. It is reported that people using milk of cows so pastured are prejudiced against the custom.

The general report of owners of property and residents in the locality is to the effect that before the sewer outlet was constructed no odors were apparent in the stream, but that subsequently they may have been very objectionable. Owners of the cows which drink the creek water state that milk allowed to stand over night would smell so badly in the morning as to preclude its use, but that when the cows were pastured elsewhere and did not drink the water which contained sewage, there was no trouble with the milk. The deterioration of milk has been a matter of consideration by the borough Board of Health. It would seem that if these statements fairly represent the facts, the sale of milk of cows pastured along the stream below the twenty-four inch sewer outlet and drinking the water therefrom should be prohibited.

The borough has no system of sewers or water works; drinking water is obtained from dug or driven wells, many of which are located in proximity to privies and cess-pools. There are no private sewers into streams. In one thousand nine hundred and three, there were six cases of typhoid fever in the borough. In one thousand nine hundred and four, there were six cases; in one thousand nine hundred and five, there were eight cases, and in one thousand nine hundred and six, ten cases were reported. From topographical evidence, it would appear that the typhoid is chargeable to the contamination of private wells.

Many of the residents of the borough live in houses which are located near the fork of the streams, directly in front of the hospital buildings. Many of these people are employed at the institution. While it would be advantageous for the State to furnish these people with public water and to take care of their sewage, more especially since the institution practically composes the borough, although not adding to its assessed valuation and purchasing power, yet it may not be considered expedient for the State to afford the sanitary facilities to the group of buildings immediately adjacent and in front of the hospital grounds. At all events, attention should at once be given to the matter of sewage disposal at the private estate in the borough and respecting the quality of the well water. Tests of this water should be made and if found contaminated all such wells should be abandoned by the local

Board of Health. Proper masonry tight receptacles for excrement should be required, cleaning out and disinfection of existing privies and cess-pools should be compulsory and regulations enforced relative to the disposal of waste water from the dwelling in order that these sources of menace to the waters of the State shall be removed and that typhoid fever shall be stamped out in the borough.

The existing sewers at the institution aggregate a length of about one mile. They should be continued as storm water conduits only and new sanitary sewers should be approved. Probably one mile of new sanitary sewers would accomplish the interception of the institution's sewage and convey it by gravity to a site for purification works in Hibbs Run ravine. An appropriation of ten thousand dollars for the new sewers should be provided and disposal works capable of treating one-half a million gallons daily would cost approximately twenty thousand dollars.

Negotiations now pending whereby the institution's water supply shall be augmented sufficiently to preclude the necessity of making temporary use of North Sandy Creek water should be consummated, hence the plan should be urged and its immediate execution recommended by the Department.

It has been determined that the interests of the public health demand that the Board of Trustees of the Institution be advised to forthwith secure an appropriation of thirty thousand dollars for improved sewerage, drainage and sewage disposal works.

Also that said Trustees seek this appropriation under the condition that the Department of Health shall cause surveys, plans and specifications to be prepared for the proposed improved sewerage, drainage and sewage disposal works and that so much of the thirty thousand dollars appropriation as may be necessary shall, on the requisition of the Department of Health, be set aside and be expended by said trustees for said improvements, under the direction and supervision and to the approval of the State Department of Health. Furthermore, that said Department shall have a general direction and supervision acting through said trustees of the operation and maintenance of the improved works after they are completed.

Harrisburg, Pa., April 15th, 1907.

ST. MARYS, ELK COUNTY.

This application was made by the Borough of St. Marys, Elk County, and is for permission to install and construct a sewerage system and sewage disposal works, and to discharge the sewage therefrom into Elk Creek, within the limits of the Borough.

It appears that the borough of St. Marys has an estimated population of sixty-five hundred and is located in the eastern central part of Elk County, near the head waters of Elk Creek which flows westerly a distance of about nine miles and enters Clarion River in the borough of Ridgway, the county seat.

The main part of St. Marys borders the creek where the lands are quite flat, which flats are hemmed in by high hills. In the western part, portions of the town on either side of the creek extend up into the hill.

There are two branches of the creek, one rising about three miles north of the borough and the other about three miles southeasterly, uniting to form the main stream in the eastern part of the borough. These tributaries have their summits at the divide between the Susquehanna River basin and the Allegheny River basin, the borough being wholly within the latter. Both oil and gas operations are conducted in the vicinity of the town to a limited extent. Bituminous coal is also mined in the vicinity.

Within the municipal limits are several important industries, all located in the valley in the eastern part, among which are the M. J. Corbett and Company Chemical Works, manufacturing alcohol and charcoal, the Pennsylvania Stave Company, St. Marys Sewer Pipe Company, partly within and partly without the borough limits, the Spees Carbon Manufacturing Company, the Hall and Kaul Lumber Company, the St. Marys Tannery Company, the Pierce Glass Company, the Stackpole Battery Company, the Standard Wood Company, manufacturers of kindling wood, the Pennsylvania Fire-proof Company, manufacturing brick and sewer-pipe, and the Pittsburg, Shawmut and Northern Railroad Company's Shops. The wastes from these industries are principally discharged into the eastern tributary of the creek. The tannery has its own private sewer extending down through the borough and emptying into the main creek below McGill Street. A mill dam is located on the creek just above said street.

It appears that at present the tannery wastes are discharged into the stream at the works.

The public water supply is furnished by a private corporation known as the St. Marys Water Company. The sources are surface waters from mountain streams, one of which is north of the borough and the other south. The water sheds are sparsely populated and the intakes are at such elevation

that the waters are required to be pumped and delivered into two reservoirs located at different places on the hills north and easterly of the borough and just outside of it, from whence the distribution is by gravity. There are about eight miles of mains in the town supplying about two-thirds of the population using about four hundred thousand gallons of water daily. An equal amount is reported to be used by the industries. Some of the industrial plants have driven wells of their own. The water company is developing an additional source of supply from Wolf Creek, four and six-tenths miles southeast of the borough. This will also be a pumping supply.

Two thousand people, or more, obtain drinking water from springs which crop out at various points on the hill sides either side of the valley, and from quite a number of dug wells reported to be scattered about in the town.

Some of the springs and most of the dug wells are in proximity to shallow earth privies, and it is a matter of public discussion that these sources are subject to possible contamination.

There is reported to be one public sewer only in the borough. It is in Brusselles Street and discharges into the creek in the central part of the town at South Saint Michael Street. The outlet is twelve inches in diameter. There are about twenty families connected with this sewer.

The tannery sewer is reported to be used by more families than have connection with the public sewer.

On the eastern tributary to the creek there is a pond just above the trotting course, and into the stream below the pond there are two sewers, one six inches in diameter serving sixteen connections, and one four inches in diameter serving ten connections. They are both private.

Into the pond there is a six inch sewer serving ten connections.

In the extreme eastern part of the borough there is a six inch sewer serving eight connections, which empties into a swamp through which the eastern tributary flows. There is also an eight inch sewer into this swamp. It has two connections.

There are numerous small water courses coming down from the hillsides through the borough on both sides of the creek, all of which receive more or less sewage from drains extending from buildings located along these water courses. This is also true with respect to the buildings along the main creek and at several points private sewers are discharged into it above the dam.

Elsewhere in the borough it is the general custom for sink and wash water to be discharged into the street gutters. Water-closets are also so discharged. Shallow earth privies abound, but owing to the general disposition of slop water into the gutters it is reported that there are very few cess-pools in the town.

There are over five hundred buildings whose wastes are disposed of in a way to menace public health. Especially on the flats, ditches, gutters and water courses are truly open sewers. The creek itself is a dark, highly colored stream, filthy in appearance, but not particularly offensive, due, it is claimed, to the disinfecting power of the chemical wastes emptied into the creek from the industrial plants.

The plans for a sewer system which have been adopted by the borough and submitted for approval comprise a system of sanitary sewers for the entire borough.

The topography of the town is such that all of the sewage may be collected by gravity to the location of the proposed sewage treatment plant on the banks of Elk Creek below the dam in the western part of the borough, on waste land between the State Road and Elk Creek. For the present it is proposed to discharge the raw sewage directly into the creek at this point. The entire sewer system has been so designated that when purification of the sewage is required, it may be economically attained by constructing the disposal plant according to plans submitted and connecting the proposed sewer outlet with it.

The main sewer outlet in the State road is to be fifteen inches in diameter. Elk Creek is sufficiently lower than the road to give the head required for the passage of the sewage vertically through the proposed sewage disposal works to accomplish satisfactory purification. The total length of sewers included in the complete plan is fifteen miles, which comprises all streets now open and the necessary main sewers over private right of way.

At an election held for the purpose on March sixteenth, one thousand nine hundred and seven, an appropriation of fifty thousand dollars, to build a sanitary sewer system, was carried by a large majority of the votes. It is reported that this additional debt, coupled with the present bonded indebtedness of the borough, nearly exhausts the borrowing capacity of the municipality.

While it is desirable that the entire sewer system should be built, the estimated cost, eighty-six thousand dollars, is in excess of the amount available for the purpose, and, therefore, the local authorities have decided to omit for the present about five miles and to immediately construct ten

and eighty-three-hundredths miles of the system. However, approval of the entire comprehensive plan is required, so that the extensions may be made from time to time as the money to pay for the same is forthcoming.

Storm water is to be excluded from the sewers, flush tanks are to be used and inspection man-holes are to be placed at street intersections and at suitable intervals along the straight courses of the sewers. Vitrified pipe is to be used in construction and joints are to be made tight. The work is to be done under the direction and supervision of the expert who designed the sewer system.

The method proposed for the treatment of the sewage is in accordance with the best modern practice, combining septic treatment, aeration, filtration and subsidence. The sewage is to be received into two grit chambers where sand and other heavier matters will deposit, whence the liquid will pass through the septic tanks designed to hold eight hours' normal flow. From the septic tanks the sewage is to pass through a twelve inch cast iron pipe to the controlling chamber located in the center of the filter bed. These beds are to be constructed of broken stone and are about five feet in depth. The sewage is to be distributed from the controlling chamber upon each bed by means of a ten inch cast iron main distributor, branching into four inch laterals having three inch vertical risers fitted with nozzles at their tops from which the sewage in form of spray will emerge and fall upon the surface of the broken stones.

The effluent collection is to be accomplished by means of six inch semi-circular tile drain laid nine inches on centres upon the filter floor of concrete. These drains will lead to concrete channels twelve inches wide in the floor of each filter frame which the effluent is to pass to the central controlling chamber and thence through a twelve inch drain to the settling basins, which are to have a capacity of one hundred and thirty thousand gallons.

The distribution and collection of the liquid at the filters and to the settling basins will be controlled by valves in the central chamber.

The effluent is to be discharged into the settling basins over the edge of the concrete channel fifteen inches wide, and after passing slowly through is to be collected at the surface on the opposite side from its entrance by a fifteen inch concrete channel, whence it will go to the creek. The vertical height between the crest of the overflow weir in the septic tanks and the same at the settling basins is nineteen feet.

A copy of a resolution properly signed by the president of the borough council, attested by its secretary, and with tht municipal seal attached, was forwarded to the Commissioner of Health, together with the application to build the sewer system according to the plans submitted. The resolution is as follows:

"RESOLVED, That the aforesaid Health Commissioner is respectfully requested to waive for the present the requirtment for building the sewage treatment plant for the partial purification of the sewage, and to permit of its being discharged untreated, into the Elk Creek until such time as such disposition may result in a serious menace to the health of the riparian owners along this creek, or to the citizens of St. Marys."

It is reported the borough's total valuation is one million two hundred twenty-seven thousand two hundred eighty dollars and that its bonded indebtedness is sixty-six thousand dollars, with a floating indebtedness of two thousand more, so that if these figures are accurate, the borough is practically up to the constitutional limit of indebtedness.

There can be no doubt about the necessity for improved sewerage in the town. Public health demands that the entire system should be built, but as previously mentioned, the cost is prohibitive at this time. The private sources of water supply are dangerous. The petitioners state that as soon as facilities are afforded in the line of sewerage for the removal of water soiled by household uses, the citizens of the town will abandon the wells and springs and take the public supply. Such an expedient is desirable. Those who use water taken from the ground in the borough should boil the water for a period of thirty minutes before the same is used for drinking or culinary purposes.

To require the town to construct the sewage disposal plant now would effectually stop the building of the needed sewers. Less mileage of sewers could be built and the money thus saved devoted to the erection of the disposal plant, whose estimated cost complete is twenty-five thousand dollars. Two septic tanks and four filter beds could be erected for possibly eighteen thousand dollars. However, it would appear that the interests of the public health would be better subserved by the rapid extensions of the sewers in the borough and the temporary postponement of the disposal works. Besides, there is lack of evidence to show what effect, if any, the manufactural effluents when intercepted by the proposed sewer system would have upon the bacteriological processes of sewage treatment contemplated by the proposed plans. This question requires further consideration before final approval could be given by the State to the sewage disposal plant. As now designed, it would accomplish the successful treatment of domestic sewage only, or of

domestic sewage mingled with a small amount of industrial waste; but it might be entirely inadequate without modification to cope successfully with a strong and peculiarly local trade waste sewage.

It appears that below the borough, between it and Ridgway, there are tanneries along the creek which discharge their wastes into it, and, in consequence of the trade waste pollution, the stream is not used by stock pastured along the banks. The Clarion River at Ridgway, during low water, produces an odor which is offensive to the people living on its banks or compelled to pass the river. The Department's attention has been called to the pollution of the stream, by refuse from pulp mills and chemical works. However, no complaint has been entered relative to the condition of Elk Creek. The Clarion River joins the Allegheny River about seventy-five miles below Ridgway. It is reported that nowhere along its course is the water used as a source of municipal supply. At various points on its banks and along its branches, especially in that portion of the water shed lying within Elk County, the wastes from tanneries, chemical, paper and pulp mills are discharged into the streams. Solution of caustic soda, lime, chloride and sulphuric acid, mingling with the waters of the stream, undoubtedly act as deodorents and disinfectants to some extent. Elk County is sparsely settled, and the interests concerned in the use of the streams as carriers of industrial waste are predominant. Not until such pollutions are discontinued, can the streams be restored to a semblance to their former purity. The act of nineteen hundred and five, relative to the preservation of the purity of the water of the State, exempts tannery liquids. Therefore, it would seem that the sanitary necessities within the borough prescribe that the interests of the public health should be best subserved by the promotion of a comprehensive sewerage system with a temporary discharge of the sewage into Elk Creek.

It has been determined that the interest of the public health demand that a permit be granted and permission is hereby and herein granted for the construction of the proposed sewerage system and approval given to the plans for the system of sewage disposal works, under the following conditions and stipulations:

FIRST: That all storm water shall be excluded from the system and that at the close of each seasons work plans of the sewers built during the year shall be prepared and filed with the Commissioner of Health, together with such other information as he may require of the borough.

SECOND: While approval is hereby given to the general plan for the treatment of the borough sewage, before such works shall be built the local authorities shall submit such further information relative to the volume and character of the sewage which may be delivered to the proposed disposal works to the Commissioner of Health as he may require before approving the details of the system.

THIRD: This permit to discharge sewage into the waters of the State shall cease on June first, one thousand nine hundred and ten. If at that time the interests of the public health demand it, the Commissioner of Health will extend the time for such discharge of the borough sewage into Elk Creek, provided, however, that the other conditions of this permit shall have been complied with.

FOURTH: This permit is issued under the express stipulation that the proper local authorities shall require the abandonment of all private sewers in existence in the borough on properties abutting a public sewer, or adjacent to such property. Attention, however, is called to possible injury which may be done to the public sewer system by the admission of trade wastes of a character inimical to the operation or permanency of the sewer. In such cases it may be advisable to require preliminary treatment of the sewage on the private property before the liquids are admitted to the sewer system.

FIFTH: If for any cause the sewerage system, or any part thereof, shall become a nuisance or injurious to the public health, then the borough shall adopt such remedial measures as the Commissioner of Health may suggest or approve.

SIXTH: No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

It is further stipulated that the borough shall submit, on or before June first, one thousand nine hundred and nine, whatever information the Commissioner of Health may require to enable him to render a final decision respecting the sewage disposal works, and that the borough shall be prepared to erect the plant during the year one thousand nine hundred and ten, in the event that the Commissioner of Health does not extend the time for the discharge of sewage into Elk Creek beyond June first, one thousand nine hundred and ten.

Harrisburg, Pa., June 6th, 1907.

SALTSBURG, INDIANA COUNTY.

This application was made by the borough of Saltsburg, Indiana county, and is for permission to extend its sewer system by building a new sewer outlet into the Conemaugh River within the limits of the borough.

The borough of Saltsburg is situated in the south-western corner of Indiana county on the north bank of the Conemaugh River opposite the point where the Loyalhanna Creek coming down from the south joins with said river to form the Kiskiminitas River. From the junction the Kiskiminitas flows northerly by the borough forming the westerly boundary thereof, and thence generally in a northwesterly course until it joins the Allegheny River opposite Freeport. The town is old, has grown slowly and at present has a population of about fourteen hundred people. It is located on a slope. Its streets have good grades and are well drained to the streams. The American Sheet Steel Company, employing about one hundred and fifty men, and the Saltsburg Bottle Works, employing possibly seventy men, afford the chief employment. The residents of the surrounding country, which is under cultivation, trade in the borough. The population decreased during the decade previous to the year nineteen hundred. The old canal bed of the Johnstown and Pittsburg Canal extends through the town and is now used as the location for the main line of the West Penn Railroad, which is a part of the Pennsylvania Railroad system.

The town owns its own water works and sewerage system. The source of the water supply is the Conemaugh River. The pumping station is located in the borough and here, by the means of two pumping engines, combined capacity three-quarters of a million, the crude river water is raised to a distributing reservoir located about two hundred and eighty feet above the river, and on a hillside back from the town. However, only the surplus water flows to the reservoir since the street mains are fed by the pumps. There are two and a half miles of four inch pipe and one-half mile of six inch pipe in the gridiron system of street mains. Ordinarily one pump is used, the other being kept in reserve. The daily consumption is said to be about seventy-five thousand gallons, and, therefore, the distributing reservoir holds about thirteen days' supply. This reservoir is constructed with a clay bottom and slopes lined with flagstone. It is uncovered and was formed by building an earthen dam across a small ravine.

The storage capacity is relatively so great that the pumps are operated only about two days each week. Generally the pumps need not be operated when the river is high or turbid. It is estimated that eleven thousand people are supplied with public water and that the remainder use wells and springs. The wells are dug and the water therefrom is said to be of inferior quality. The water works system was constructed in the year one thousand eight hundred and ninety-four, and at the present time no enlargement is contemplated. The rolling mill of the American Sheet and Steel Company is said to obtain its water supply from the river. This plant is located below the borough in what is known as Saltsburg extension.

The assessed valuation of Saltsburg is reported to be two hundred and seventy thousand dollars and its outstanding bonded indebtedness approximately seventeen thousand, hence it is at once evident that the municipality has practically reached its borrowing capacity, unless it should be possible to strike the water works bonds from the municipal debt.

The sewer system was begun in the year one thousand nine hundred and one and has been extended from time to time since. The conduits receive both sewage and storm water and empty into the streams at convenient points.

Passing down stream from the pumping station, the first sewer outlet into the river is at the foot of an alley south of Chestnut street. This point is over a thousand feet below the borough pump house and intake. The sewer is eighteen inches in diameter, eight hundred and fifty feet long and serves about one hundred people.

The next sewer outlet into the river is at the foot of Point street. It is twenty inches in diameter and serves a district comprising four thousand two hundred feet of sewers, the smallest diameter being eight inches. The sewers are said to be used by about three hundred and fifty people.

The next sewer outlet is into the river at the foot of Washington street. It is eighteen inches in diameter and serves a total length of two thousand fifty feet in which the smallest part is eight inches in diameter. Two hundred and fifty people are said to be contributors.

In the northern part of the borough at the end of Salt street there is a twenty-four inch sewer with an eight inch connection, total length about five hundred feet and reaching about fifty people.

It is reported that the population living in the district sewered is approximately one thousand, of which about seven hundred and fifty people live in dwellings connected with the sewers. The remaining population use shallow privies.

It appears that the four sewer outlets are so arranged that they may be reached by an intercepting sewer if it became necessary to provide some other method of disposal than into the river.

The proposed sewer is in the southern part of the borough at the south end of Salt street, and will comprise a new outlet into the river twelve inches in diameter. During the early part of September, nineteen hundred and six, on petition from four citizens residing in Salt street and Canal street, the borough council providing for the construction of a public sewer to take sewage and street drainage from Canal and Salt street under the West Penn Railroad and across private property to the Conemaugh River, and asked permission of the State Department of Health to build this sewer, one of the reasons urged being that permanent street pavement improvements made necessary the laying of the sewer in advance.

It appears that this sewer will be in the neighborhood of two hundred and fifty feet long and will have sizes varying from eight inches to twelve inches in diameter.

The first municipality below Saltsburg obtaining a water supply which may be polluted by Saltsburg sewage is Freeport, on the Allegheny River just below the mouth of the Kiskiminitas and about twenty-seven miles distant from Saltsburg. Below Freeport in a distance of twenty-three miles there are nine other places taking the public supply of water from the Allegheny River, comprising in all a total population of over half a million people. During freshets the sewage from Saltsburg probably reaches Pittsburg in twelve hours or less. The following given municipalities take their water supply from the river below Saltsburg: Freeport, population seventeen hundred, distant twenty-seven miles; Tarentum, population fifty-five hundred, distant thirty-four miles; New Kensington, population forty-six hundred, distant thirty-six miles; Parnassus, population seventeen hundred and ninety, distant thirty-seven miles; Oakmont, population twenty-three hundred, distant forty-three miles; Verona, population nineteen hundred, distant forty-four miles; Pennsylvania Water Company, population forty thousand, distant forty-six miles; Allegheny, population one hundred and thirty thousand, distant forty-four miles; Pittsburg, population three hundred and twenty thousand, distant forty-eight miles; and Sharpsburg, population sixty-eight hundred, distant fifty miles.

The Conemaugh River drains an important industrial and coal mining region. The city of Johnstown and the boroughs of Blairsville and Indiana, besides many other places, discharge their sewage into this river or its tributaries. Johnstown is twenty miles above Blairsville and thirty-six miles above Saltsburg. Indiana borough is thirty-four miles above Saltsburg on a tributary. The waters of these streams receive large amounts of sulphur mine drainage, which drainage is known to be inimical to the life of pathogenic organisms. The belief is prevalent among the public authorities in Blairsville and Saltsburg that the danger of obtaining the public supply of water from the Conemaugh River without the filtration of the water is eliminated because of the destruction of sewage of the municipalities up stream by the acids in the river. The Department does not have information at hand relative to the degree of acidity of the Conemaugh River at Saltsburg, nor as to the percentage of the time during the year when the river is alkaline or when sewage discharged into the waters at points above would be most likely to reach Saltsburg's intake and be introduced into the system of pipes in the borough in a condition capable of causing general infection, but judging from topographical evidence this result can happen during any month of the year. Undoubtedly the long storage of water in the reservoir on the hill above Saltsburg materially aids in the interception and destruction of sewage organisms, and to this fact may be attributed the relatively small amount of typhoid fever occurring in the two municipalities of Saltsburg and Blairsville, each using unfiltered river water, but the latter system not affording adequate subsidence facilities. However, during the times the pumps are run at Saltsburg, any poison in the river water may be sent through the pipes directly to the consumer's residence and the danger of this occurring is of enough importance to demand insurance. Such insurance should be first afforded by the immediate installation of a water filtration plant, and, second, that afforded by the discontinuance at as early a date as practicable by the State of the discharge of sewage into the streams above from municipalities.

Because Saltsburg has not been visited by the scourge of typhoid is no reason why the State or local authorities should overlook the danger and not take the ordinary precautionary measures against an epidemic, especially since the insurance is easily possible. Undoubtedly, were not the Conemaugh River an acid stream to a greater or less degree, the people of Saltsburg would have been forced by loss of human life to recognize the importance of filtering the public water supply. It is because the purifying agencies at work in the river cannot be regulated and controlled that the interests of the public health demand that sewage should be kept out of the stream and that the water be first filtered before being used for drinking purposes. This argument obtains with respect to Saltsburg sewage. The petty sewer extensions under consideration will not materially increase the pollution of the river, but Saltsburg is one of the many sources of pollution of the municipal water supplies below which it

is essential should be protected and the State's policy is to bring about a diminution rather than an increase in the amount of sewage emptied into streams tributary to these supplies.

Since Saltsburg is practically at the limit of its borrowing capacity under the present system of valuation, and even were this valuation doubled there might not be money enough to defray the cost of intercepting and purifying the municipal sewage unless outside financial aid were obtained, it is possible that this case may be one worthy of assistance by the State in the event of recent legislation becoming a law. It would seem, therefore, that approval of the proposed sewer extension might be given with certain modification obviating an increase of sewage pollution in the river.

It has been determined that the interests of the public health demand that a permit be given and a permit is hereby and herein granted for the construction of the proposed sewers, under the following conditions and stipulations:

FIRST: That the sewers may be laid, and street, roof and sink drainage be admitted to the sewer, but that no water closet connection or fecal matter whatsoever shall be discharged into the sewers until a permit be granted therefor by the State Department of Health.

SECOND: On or before the first day of May, one thousand nine hundred and nine, the borough shall prepare a plan or plans which shall have for an ultimate object the discontinuance of the discharge of any sewage from the borough of Saltsburg into any of the waters of the State which plans shall be submitted to the State Department of Health for approval.

THIRD: No extensions of the existing sewer system shall be made until after said plan for the interception of the borough's sewage and its purification before being discharged into the river shall have been submitted to and approved by the State Department of Health, and in the consideration of this problem which should be taken up at an early date, the Commissioner of Health would be glad to advise and co-operate with the local authorities.

FOURTH: The right to discharge sewage into the waters of the State shall cease in Saltsburg on the first day of May, one thousand nine hundred and nine, but if on that date the interests of the public health demand it, the Commissioner of Health will grant an extension of time provided the other conditions of this permit shall have been complied with.

It has also been determined that the interests of the public health demand that the borough authorities be notified by the Commissioner of Health, and said authorities are hereby and herein so notified, that its present source of water supply is prejudicial to public health and that the public health should be safeguarded by the installation of an approved water purification plant, and that meantime the public should be warned to boil all water used for drinking and culinary purposes.

Harrisburg, Pa., June 10th, 1907.

SCALP LEVEL, CAMBRIA COUNTY.

This application was made by the borough of Scalp Level, Cambria county, Pennsylvania, and is for permission to install a new sewer and to discharge the sewage therefrom, untreated, into Little Paint Creek within the limits of said borough.

The new borough of Scalp Level is a flourishing mining community of about one thousand population located in the valley of Paint Creek in Cambria county, on the line between said county and Somerset county. It is bounded on the north, east and west by Richland township and on the south by Paint borough which lies wholly within Somerset county. The latter municipality has a population of about one thousand and in Windber borough, adjacent and south of Paint borough, there is an estimated population of about five thousand. These three places are practically all one community and owe their existence to the extensive coal mine operations of the Berwind-White Coal Company, which owns and operates eleven of the twelve coal mines in the district. Prior to these operations, Scalp Level was a small farming village. The two other boroughs are of recent origin.

Little Paint Creek rises in the mountains northeast of Scalp Level borough and has a course of about six miles, joining Paint Creek proper in the borough at the county line.

Paint Creek proper rises in the mountains to the east at the summit of the Allegheny Range forming the basin systems of the Susquehanna and Ohio Rivers, and after a winding course of eight miles westerly, partly in Cambria county and partly in Somerset county, through the boroughs of Windber and Paint, it forms the southern boundary of Scalp Level borough at the western end of the town. Continuing, it flows through a narrow, steep, wooded valley with sides several hundred feet high, a distance of about two miles to Stony Creek. The latter stream flows generally northerly from this point in a winding course through a wooded and sparsely populated farming valley nine miles to its junction with the Conemaugh River in the city of Johnstown. Excellent

passenger transportation facilities between said city and borough is afforded by a trolley line extending up the valley of Stony and Paint Creeks. Adjoining Johnstown city, and hence in the lower Stony Creek valley, are the boroughs of Daisytown, Dale, Westmont, Roxbury and Ferndale.

Scalp Level borough is very generally supplied with public water from the works owned and operated by the Richland Township Water Company. The water is obtained from a dam on Little Paint Creek located about two miles above the borough. However, the dam is below the village of Elton, population two hundred and fifty, on the stream and the Scalp Level branch of the Pennsylvania Railroad extends along the creek and is also a possible menace to the said water supply. On October twelfth, nineteen hundred and six, a formal notification to abate a nuisance near the village of Elton, arising from the pollution of Little Paint Creek by slaughter refuse, was served on the owner of the premises by an officer of the Department. Recently an investigation of every occupied estate on the drainage area above the dam has been ordered. A new and unpolluted water supply is contemplated by the water company. There are a few dug wells in the borough, but the petitioners do not represent that sewers are needed to protect these wells.

Below the dam, mine water from three coal operations is pumped into the stream. Two of these mines are about a mile above Scalp Level and the average amount of pumping therefrom is two million gallons per day. The other mine is within the borough limits.

Above the upper mines there is no visable evidence of pollution in the stream in the vicinity, but immediately below the presence of sulphur water is noticeable. During low stages, the mine drainage forms the principal part of the creek flow. This drainage precludes the use of Little Paint Creek and Paint Creek proper for domestic purposes. Besides there are other mines whose drainage is discharged into Paint Creek. Four of them are in Windber borough or above, and two of them below the confluence of the Big and Little Paint Creeks. Below, as far as Johnstown, so far as the Department is informed, no uses are made of the natural water courses except for drainage. The sewers of Windber and Paint boroughs and of the other municipalities herein mentioned all discharge into the streams. The grades are comparatively steep and, therefore, the velocities assure speedy removal of sewage away from the towns when the flow is sufficient. During dry weather, on the banks of the main creek at Scalp Level, there is an apparent odor of decomposing organic matter. It is into these waters that Scalp Level wishes to discharge sewage also. There being an abundant public water supply, it is the problem of how to dispose of the great bulk of it after use in some of the dwellings which brings the desirability of public sewerage forward at this time.

The original Scalp Level village as it is to-day, consists of the buildings on either side of Johnstown turnpike which thoroughfare passes from Paint borough northerly across Little Paint Creek and up the valley thereof on the west side.

The new village, comprising regularly laid out streets, and cottages erected and owned by the Berwind-White Coal Company, is also located on the west bank of the creek on the hillside in the extreme eastern portion of the borough. The latter is entirely a mining settlement.

The church, school building, hotels and stores are in the old village.

There are between fifteen and twenty private drains to the creek, so it is reported, most of them being from buildings located on the east side of the turnpike. Recently a large modern school house has been erected on the north side of the road in the old village, modern plumbing facilities have been provided and it is principally to afford facilites for removal of sewage from this building that the borough has asked permission to construct a public sewer.

The petitioners represent that there is no way to dispose of the waste water from the school house and the buildings on the west side of the turnpike in a satisfactory manner except by a public sewer and permission is asked to lay a public sewer southerly in the turnpike from or near the school building to the creek. The points of discharge first proposed were into the stream at the railroad culvert in the central part of the borough and also where the highway crosses the creek in the southern part of the old village. This plan was abandoned, however, because of local opposition and the plan submitted therefor calls for one outlet into the creek at a point near its junction with Paint Creek proper.

The size of the sewer proposed is not stated, neither are the grades given or any other details. It is evident that very little consideration has been bestowed upon the question from an engineering standpoint.

The School Board has made a special request to be permitted to temporarily construct a sewer to the creek on the ground that without an outlet for the sewage from the building, outside privies will have to be erected and used and the facilities now within the building abandoned. This is stated to be so because the construction of the proposed borough sewer must require many

weeks and the benefits thereof would come too late for pressing needs. The board also represents that the proposed public sewer is not adapted to serve but a few of the properties in the borough.

The Burgess of the borough has submitted a written remonstrance against the approval of the proposed sewer plan on the ground that in his opinion it is against the interests of the majority of the taxpayers in the municipality, that the benefits of the sewer would accrue to not over one-fifth of the property owners in the town, that the cost is excessively high, and that the plans have not been sufficiently considered by the borough council.

It appears that in the eastern village of the borough there are the two hundred frame dwellings in pairs owned by the coal company, that the water supply has not been introduced into the houses but may be obtained from outside hydrants, and that there is no provision for disposal of wash water and slops except onto the ground in the yards. The whole area comprising about twenty-five acres is extremely damp, the ground water being naturally near the surface. There are several small streams running between the houses. Excrement is disposed of in dug privy vaults boarded up in which water was standing at the time of the Department's inspection. These conditions are not those which promote health, although about half of the borough population reside there. In case of an epidemic, preventive measures would with difficulty be enforced because of the said conditions. Any plan of sewers for the borough would not be complete if eventually the sewage from this village could not be taken into the public system, provided, of course, that the growth of the district should render necessary the interception of the sewage from the entire borough and its discharge either treated or untreated at some point into the main stream sufficiently below the borough of Scalp Level to avoid a public nuisance.

The fact that sewage odors are evident in the vicinity of sewer outlets and on the immediate banks of the streams in Windber, Paint and Scalp Level boroughs, is local proof of the well known truth that even the disinfecting and germicidal effect of acid mine water on sewage is not sufficient to obviate a nuisance beyond a limited extent.

Although it would be eminently unfair to discriminate against Scalp Level borough, while other municipalities were discharging their sewage into the waters of the State, nevertheless, it behooves the local authorities of these municipalities, in making plans for sewer extensions or the introduction of new sewer systems, to contemplate possible nuisances and to provide reasonable remedial measures therefor.

A sewerage plan for Scalp Level should be so designed that it may be extended from time to time as necessity may require to all parts of the borough. Ample legislative provision has been made for the equitable apportionment of the cost of sewers on abutting estates according to benefits conferred. A choice of methods of assessment or of payment for sewers is a matter with which the State Department of Health is not concerned; but any sewer plan worthy of approval by State authority must be definite and comprehensive and suitable to serve the interests of public health. It is evident that no such plan has been submitted by the petitioners. The State cannot advise with respect to the suitability of the project until details thereof shall have been submitted for consideration. The borough needs the services primarily of an engineer to make surveys and prepare plans for a comprehensive sewerage system. All storm water should be excluded from the sewers thus saving expense without detracting from efficiency. It is possible that in the future the boroughs of Windber and Paint may find it in the interests of public health to join in a project for a trunk intercepting sewer to take the sewage of these places to some point in the creek below all three boroughs, and Scalp Level might at that time, with advantage, connect to such a separate sewer outlet. This is possibly an added reason for the providing of sewers for the conveyance of sewage only.

Apart from the discussion of nuisances is the question of the necessity from the standpoint of public health of the absolute destruction of these germs as soon as possible after they leave the bodies of human beings and animals, and before they are discharged into bodies of water where they may do harm. It is not beyond the bounds of possibility that the chemical properties of mine drainage may be utilized to effect such destruction. If means were perfected to treat municipal sewage in mining villages there would be a marked diminution in the pollution of the water supply of towns which must continue to draw their sources from the river which drain the mountainous districts and coal fields. There are periods of several weeks duration when the run-off from the upland watersheds is so great that the germicidal effect of the acid waters is probably neutralized during which the sewage from the mining towns, in its more nearly nascent condition may reach the water works intakes of the down stream town.

The waters of the region under discussion are discharged by the Conemaugh River into the Kiskiminetas River and through the latter into the Allegheny River opposite Freeport. Twenty miles below Johnstown, the borough of

Blairsville is located on the Conemaugh River and obtains its public water supply from this source. Thirty-six miles below Johnstown the borough of Saltsburg also obtains its public supply from the same river. About twenty-seven miles below Saltsburg, the borough of Freeport derives its supply from the Allegheny River and below Freeport in a distance of twenty-three miles there are nine other places which take the public water supply from the Allegheny River. The sewage of Johnstown may, under certain conditions, be transmitted down the river and introduced into the homes of water consumers at Blairsville and Saltsburg, etc., in a condition capable of producing an epidemic. Because this has not happened in the first two mentioned places is not a reason why it may not happen. The danger exists.

It is extremely probable that within the period for which it is economical to design sewers, a change in the methods of disposal of sewage other than into the streams will be brought about in the Conemaugh River basin. The local authorities should ponder these matters in deciding upon a sewer system.

It is reported that the valuation of the borough is about two hundred and twenty thousand dollars and that there is a bonded debt of five thousand dollars, which, if true, establishes the municipal borrowing capacity at about ten thousand dollars. It is also reported that there are funds on hand in the treasury and, therefore, the town is amply able to engage the services of a competent engineer to carry out the suggestion relative to sewerage plans herein mentioned. Such a method of procedure will in the end prove very satisfactory because it will bring about the adoption of the most efficient and satisfactory system. The town is not wealthy enough to afford a costly mistake.

It has been unanimously agreed that the interests of the public health demand that a permit be granted and it is herein granted to the borough for the construction of a part of the proposed sewer only, which part shall be necessary for the drainage of the public school building, under the following conditions and stipulations:

FIRST: That a six inch pipe sewer may be laid from the public school building in the borough easterly in the public highway and under the turnpike to Little Paint Creek, that sewage only shall be discharged into this sewer, and that it shall be laid out in such a way as to be adapted to incorporation into a separate sewer system for the entire borough.

SECOND: Permission to discharge the sewage from this school house sewer into Little Paint Creek at the point herein approved north of the railroad culvert shall be temporary only and shall expire one year from the date of this permit, but if on or before said date of one year after the issuance of this permit, the borough shall have prepared a plan for a comprehensive sewerage system for the entire borough in general compliance with the suggestions herein contained, and shall have submitted the same to the Commissioner of Health for approval, then the Commissioner of Health may extend the time in which the sewage from the school house sewer may continue the discharge into Little Paint Creek at the point mentioned.

THIRD: This permit is issued with the express stipulation that approval of the sewer does not convey any right of trespass on private property other than under the conditions duly authorized by law empowering boroughs to provide adequate sewerage and drainage.

The Department of Health will be very glad to further advise and consult with the borough authorities relative to the preparation of plans for the comprehensive system.

Harrisburg, Pa., November 23rd, 1907.

SHALER TOWNSHIP, ALLEGHENY COUNTY.

Glenshaw Village.

This application was made by the Commissioners of the township of Shaler, Allegheny county, Pennsylvania, and is for permission to construct a system of sewers in the village of Glenshaw, said township, and to discharge sewage therefrom untreated into Pine Creek, within the limits of said township.

Shaler township is managed by a Board of Commissioners in compliance with laws regulating first-class townships. It is located in Allegheny county and extends from the north bank of the Allegheny River opposite the city of Pittsburg, northerly for about five miles. Out of it have been incorporated Etna and Millvale boroughs which border on the river. Through the east part of the township there is a stream known as Pine Creek whose course is south to within about one-fifth of a mile of the Allegheny River where it turns and parallels the river for nearly a mile before entering the same. The last mile and a half of its course is in Etna borough.

The village of Glenshaw is located on this creek about two miles above said borough. Glenshaw station, in the northern end of the village, is on the Baltimore and Ohio Railroad seven miles above the Baltimore and Ohio sta-

tion in Allegheny City. It affords the only means of access and exit from the village, except the old Butler Turnpike known as the Plank Road. This highway and the railroad follow up Pine Creek gorge, crossing it and recrossing it for favorable locations. On either side are steep slopes or precipitous bluffs from one hundred to upwards of two hundred feet in height. Glenshaw village is located on the west bank of the creek on a steep slope which culminates in a ridge and small rather level plateau north and south for several miles.

On this ridge is the new Butler turnpike and the trolley line of the Pittsburg, Butler and New Castle Street Railway Company. This line parallels the Baltimore and Ohio Railroad and competes for passenger traffic in the territory.

Township Road, so called, leads up to the ridge from Glenshaw Station, and on the summit there is a tract of land of considerable extent which was laid out a few years ago for building purposes by the King Oaks Real Estate Company. A few houses were erected and sewers constructed, the outlet being twenty-four inches in diameter, and extending down the hillsides in the southern part of Glenshaw village to Pine Creek. It is reported that the said twenty-four inch sewer was designed to be the outlet for a combined system. Probably less than seventy-five people now use this sewer.

The present village is on the hillside between the ridge and the creek. There are about fifty residences here, ranging in cost from four thousand dollars to twenty thousand dollars and located on house lots averaging half an acre each. The available lands on the hillside are quite thoroughly occupied.

There is a rather level and low tract in the southern part of the village on either side of the creek but principally to the east of it where there are possibly thirty dwellings of the less expensive class. This land is liable to flood, being upwards of five feet from the bed of the creek. In this low part of the village there is a natural basin which is purposely flooded by creek water in the winter to promote the formation of ice which is harvested and sold for cooling purposes only, so it is claimed.

So far as the Department know there is but one sewer in the village. It is owned by private individuals. It is ten inches in diameter and removes the sewage of possibly six or seven dwellings besides some roof water, and discharges into Pine Creek just above the passenger station. The remaining inhabitants use privies and cesspools. The soil is clayey and impervious, so that the cesspools readily fill up and overflow on to the surface of the ground.

There is no system of public water works, the people deriving their supply from driven wells on the premises. There will have to be a liberal supply of water if the territory grows and this will require adequate sewerage for its removal.

On June fifth, one thousand nine hundred and six, the township commissioners asked permission to build one-half mile of ten inch and twelve inch sewers to receive both sewage and storm water, these sewers to be built in Wilson and Charles streets with an outlet into Pine Creek about five hundred feet below the passenger station.

At that time it was ascertained by the Department that the drainage area of Pine Creek above Glenshaw is approximately fifty square miles. In summer the flow is an inconsiderable amount. The creek is not a rapid stream. The fall is gradual, the course tortuous and the current sluggish except during storms when the volume may suddenly increase a hundred fold. The village of Lancelot, Wildwood and Gidsonia are respectively four, five and eight miles above Glenshaw. Probably sewage is indirectly discharged into the streams at these places. It was also ascertained that the Etna Rolling Mills take water from the creek below Glenshaw and use it for various industrial purposes. Probably the mill hands disobey injunctions and occasionally drink the water as is generally done elsewhere. The sewage from this plant and from Etna borough is in turn discharged into Pine Creek and reaches the Allegheny River below the intake of the city of Pittsburg's water supply, but about three miles above the River avenue pumping station inlets of the Allegheny city water works.

Also at that time the fact was noted that the Allegheny River is the source of supply to the citizens of Allegheny city and that the water is not subject to purification. The principal supply is taken at Montrose about nine and one-half miles above the city. The River avenue pumping station may in the future be maintained and used for emergencies only; but now as regularly operated, it supplies about one third of the city's daily total consumption. Therefore it was concluded that so long as it is possible to introduce raw river water into the water pipe system from the River avenue pumping station, the discharge of sewage at any point along Pine Creek is a menace and should not be sanctioned by the Commissioner of Health unless it should appear that the interests of the public health demands such discharge temporarily only.

On October eighteenth, one thousand nine hundred and six, the Commissioner of Health gave a hearing at Harrisburg to the Commissioners of Shaler township and to citizens of the village of Glenshaw at which time the fact was brought out that the seepage of cesspool matter into the individual wells

at Glenshaw and the desire to abandon cesspools was the reason for the application for permission to build public sewers. Much of the typhoid fever in Glenshaw has been attributable to the pollution of the water. Many of the cases originated in Pittsburg but those among the school children indicated a local origin of infection. Physicians had advised the boiling of all drinking water. While the proposed sewer system would be a good thing for Glenshaw it did not take into concern the interests of general health outside of Shaler township. The Commissioner of Health informed the Commissioners that the adoption of a combined system of sewers in which both sewage and storm water were to be discharged, would not be approved. That the proposed sewers were not the part of a comprehensive system and that a competent engineer should be employed to design a complete system for the whole territory. The plan should provide for separate sewers and storm drains and for the conveyance of the sewage to one point adapted to the erection of a sewage purification plant, and that Shaler township would be required to conform to the general State policy for the ultimate taking out of all sewage from the streams.

The plans under consideration at this time were prepared by an engineer and purport to be a comprehensive system, comprising about four thousand five hundred feet of eight inch pipe, one thousand two hundred feet of ten inch pipe, and one thousand seven hundred feet of twelve inch pipe. The latter is in the Butler Plank Road at the foot of the hill, and is to discharge into Pine Creek below the village where the present twenty-four inch sewer outlet from the King Oaks tract now discharges. The application states that no record of the size or location of the sewers in the King Oaks tract have been obtained, and therefore, the plan does not contemplate taking these sewers into the system. However, the proposed public sewer in Township road and in Carson street adjoins said tract.

Manholes are shown at street intersections and at changes in alignment, the sewers are to be flushed automatically by the regulation flush tank, and they are to be ventilated by perforated manhole covers.

It is not stated whether the existing sewer in the village is to be incorporated into the proposed public system.

It appears that the twelve inch outlet is to be laid on a grade of five-tenths per cent. for a distance of fourteen hundred feet in Plank Road from the outlet into Pine Creek, and that this outlet is to be at about low water in the creek. The petitioners state that the water rises in the creek about ten feet, in which event it would back flood the twelve inch pipe.

The application states that there are about fifty acres of ground lying to the northwest of the village which can be drained into the system at some future time. How this may be done is not shown. No mention, whatever, is made of sewerage facilities for the territory east of the creek on the flats. Neither is any site for a purification plant mentioned or shown. To the contrary the adaptation of the outlet sewer and hence its tributary sewers, to the ultimate and efficient treatment of the sewage, is left wholly for conjecture, all of which is entirely at variance with the advice and suggestions given by the Commissioner of Health to the Township Commissioners at the hearing in Harrisburg, in October of one thousand nine hundred and six.

It appears now that approval of the proposed plans would involve the pumping of the sewage into a purification plant whenever such works are erected. This in fact may not be so, but failure on the part of the petitioners to submit evidence to the contrary, coupled with the plans thus far presented, justifies this conclusion. In view of the fact that the territory to be sewered now and in the future is almost wholly on high land, it would seem to be an absurd policy to so conduct the sewage to the creek as to require the lifting of the sewage again for purification. Such a life involves an element rendering almost certain the direct discharge of sewage into the creek after the time when works shall have been built to prevent such discharge. The flow of sewage in Glenshaw should be by gravity to the purification works. The site for these works should be selected and the engineer should design a comprehensive sewerage system as fully set forth by the Commissioner of Health at the said October hearing, the object of this comprehensive plan being the most efficient collection of the sewage from all of the territory in Glenshaw and vicinity, which may now or ultimately deliver sewage to the creek, and its conveyance by gravity, or otherwise if absolutely necessary, to the proposed sewage disposal works.

The discharge of sewage from private sewers into Pine Creek must be discontinued. The users of sewers in the King Oaks tract, and the users of the private sewer in Glenshaw village will be notified to this effect. The public sewerage system should take the sewage from these private estates into it. The matter of assessment or payment for this privilege is one for the local authorities to arrange. If permission be not given the said private estates to sewer into the public system, then such an act would be a discrimination. The existing sewer outlets must be closed, and hence either the individual

owners must resort to cesspools, or have an outlet to the public system. Since it is the abandonment of cesspools for which the public sewer system is most demanded, it is clearly evident that the proposed system is not comprehensive enough, and that it is necessary that the petitioners should ascertain the sizes and location and condition of the sewers in existence in the village and adjacent territory, and provide for their incorporation into the proposed sewer system, if this be practicable. Otherwise new sewers must be built there and this should be clearly set forth in the plan.

Furthermore, the Department is requiring the preparation of plans for the treatment of municipal sewage of various municipalities in the Allegheny River basin in the vicinity of Pittsburg. There is no reason given why the petitioners should be excluded or exempted.

It has been unanimously agreed that a permit be granted and it is hereby and herein issued for the immediate construction of sewers in the village of Glenshaw on the hillsides under the following conditions and stipulations:

FIRST: That on or before January first, one thousand nine hundred and eight, the detailed and comprehensive plans for sewerage and sewage disposal works herein outlined shall be prepared by the petitioners and submitted to the Commissioner of Health for approval.

SECOND: That all the proposed sewers, except the Butler Plank Road outlet, may be built as proposed, but the Butler Plank Road sewer shall not be built and used until the comprehensive plans of sewerage and sewage disposal works herein required shall have been submitted to and approved by the Commissioner of Health. And furthermore, the said other sewers herein approved shall not be used until after such approval of said comprehensive plans.

THIRD: All roof and storm water shall be excluded from the system, inspection manholes shall be built at all street intersections and at changes in alignment and grade of the sewers.

The object of this permit is to expedite the construction of those sewers which are adapted to become a part of the comprehensive system of sewerage and sewage disposal works demanded in the interests of public health. A permit will be issued for their use, stipulating conditions as soon as the said comprehensive plans shall have been submitted to and approved by the State authorities.

Harrisburg, Pa., November 9th, 1907.

SUMMIT HILL, CARBON COUNTY.

This application was made by the borough of Summit Hill, Carbon county, Pennsylvania, and is for permission to construct a sewer system and to discharge sewage therefrom into the streams in the vicinity of said borough.

It appears that the borough of Summt Hill, Carbon county, Pennsylvania, is located on the summit of Pisgah Mountain, at the divide between the basin of the Schuylkill River to the west and the basin of the Lehigh River to the east. The country here is very beautiful, and the outlook from Pisgah Mountain most commanding. Below it, and immediately north, lies the borough of Lansford, and ten miles east is the borough of Mauch Chunk. About three-fourths of Summit Hill naturally drains northerly into Panther Creek, a tributary of the Little Schuylkill River, and the remaining one-fourth of the borough drains southerly into Mauch Chunk Creek which enters the Lehigh River at Mauch Chunk.

It is reported that the first anthracite coal in Pennsylvania was discovered and mined at Summit Hill about eighteen hundred and twenty. Some of the richest coal veins in the anthracite district exist in the Panther Creek valley and on the north slope of Pisgah Mountain, and there are large deposits of coal immediately west of the borough. The town is wholly dependent upon the coal industry.

Of its total population of three thousand two hundred people, two thousand eight hundred obtain water from the Summit Hill Water Company. The remainder use private wells and springs in the borough.

The public supply was originally obtained from springs located near the upper end of Mauch Chunk Creek. The water had to be pumped to the town. These springs proved inadequate, and at the present time, the supply is obtained from a driven well for short periods during dry weather it is occasionally necessary to pump water from Mauch Chunk Creek. The area of the water shed above the pumping station is not over one and a half square miles. Upon the drainage area a few families reside. The stream is fed by numerous mountain springs. A soft satisfactory water is furnished by the driven wells. It is approximately three hundred and forty feet deep, eight inches in diameter, and sunk into Mauch Chunk red shale. The water is pumped through about three thousand and two hundred feet of eight inch pipe, a vertical height of about four hundred and eighty feet, into an earthern reservoir located on the

highest part of Summit Hill borough, whose elevation is sixty-five feet above the highest part of the town. All of the water supply goes through this reservoir.

In Summit Hill there are possibly fifteen cess-pools and upwards of six hundred shallow earth privies. Private well water is thought to be more or less polluted by surface contamination and the proposed sewers are wanted as a safeguard against unsanitary conditions.

There are three sewer outlets in the borough. They were constructed since eighteen hundred and seventy, take both sewage and storm water, and are too shallow in places, inadequate and unsatisfactory. As soon as the proposed sewers are installed, the intention is to either abandon or to use the existing sewers as storm water drains only. The total length of these sewers is one and twenty-five-hundredths miles. Connected therewith are about one hundred and eighty buildings.

The Holland street outlet empties into Ammidon street, follows the channel along said street and down a valley to a tributary of Little Mauch Chunk Creek. About one hundred people are reported as using this sewer. It takes kitchen waste and surface water and the discharge from two water closets. During the summer months numerous complaints are made about the odors produced by the sewage in the streets. It is claimed that the sewage seeps away into the ground during dry spells, but during freshets or heavy rainfalls, it is washed by the storm water down into Mauch Chunk Creek and constitutes a menace to public health by reason of the fact that the citizens of Mauch Chunk are at times supplied with water drawn from Mauch Chunk Creek at a point below where the Holland street sewage would enter the creek.

The Railroad street sewer outlet empties into a stagnant pool in the southwestern part of the village. The water slowly seeps away into a burning mine below. It is reported that four hundred people use this sewer. The structure varies in size from fifteen inches in diameter to two feet by four feet in diameter, and receives sewage and storm water. Water in the pool creates a nuisance and has been the cause of many complaints.

The Hazard street outlet serves about three hundred people, is eighteen inches in diameter and discharges to the north of the borough down the mountain side in the direction of Lansford. It is reported that the sewage seeps away into the ground along the bushes and brush without causing a nuisance.

The poor construction of the existing sewers and the demand for a general extension of an up-to-date system has made it appear desirable to local authorities to provide for an entirely new sewer system.

The new system proposed is to receive both sewage and storm water. The outlets of the new sewers will be in the same general locality as the outlets of the old sewer. There are to be four drainage districts.

The proposed Holland street district will comprise about forty acres, reach about four hundred people, have an outlet twenty-two inches in diameter and empty into the tributary of Mauch Chunk Creek above the point from which water is sometimes drawn for public uses in Mauch Chunk.

The proposed Hazard street district will comprise about fifty acres, reach about one thousand people and have an outlet thirty inches in diameter and discharge on the same area as the existing Hazard street outlet, at a point about two thousand feet above the colliery of the Lehigh Coal and Navigation Company.

The proposed Railroad street district is the principal one in the town. It will comprise an area of about seventy acres, reach about fifteen hundred people and have an outlet thirty-six inches in diameter, which, if necessary, can be carried westerly along the mountain side to Slum Creek, a tributary of Panther Creek which it joins a mile or so below Lansford.

The proposed West White street district will reach about one hundred people, have an outlet eighteen inches in diameter and discharge down the mountain side into the outcrop of a mammoth coal vein about one-third of a mile from the built up part of the borough to the north-west.

Thus it may be seen that the total length of proposed sewers is approximately four miles. It is expected that the entire borough population will be reached within two years. The engineers of the Lehigh Coal and Navigation Company have prepared the designs.

No detail estimates have been made, but it is stated that the cost of the proposed sewers may reach sixty thousand dollars. The assessed valuation of Summit Hill is about six hundred thousand dollars and since the borough is reported to have a bonded indebtedness of five thousand dollars only, it appears that an additional bond issue of thirty-seven thousand dollars can be authorized. Were sanitary sewers to be provided instead of combined sewers, possibly the total cost for sewerage might be reduced one-half.

In any event, the State cannot sanction the discharge of sewage anywhere in the valley of Mauch Chunk Creek, but in the valley of Panther Creek, below the coal outcroppings, the discharge of sewage into the streams receiving mine

drainage may not be a matter of so serious importance and possibly such a discharge be permitted for a short time until the municipality were able to assume the expense of providing suitable sewage purification works.

The waters of Panther Creek and of the streams into which it empties are rendered unsuitable for domestic or manufacturing uses because of mine drainage, and sewage discharged therein is known to be largely dissipated and destroyed owing to the acidity of the waters, together with the presence of certain chemicals which cause the formation of a coagulant and the precipitation of suspended matter. But while such is known to be the fact it does not necessarily follow that sewage can be indiscriminately discharged into such water and hence any sewerage plan for Summit Hill should be devised in contemplation of some time being adapted to connection with sewage disposal works. Because it has been unanimously agreed by the Governor, Attorney General and Commissioner of Health that the Department of Health should undertake experiments at Lansford to determine to what extent, if any, the natural purifying agencies present in mine drainage may be availed of to treat sewage, it would seem fitting that approval be given to the proposed construction of sewers at Summit Hill provided the plan for sewers is adapted to the treatment of the sewage therefrom, and since it would not be practicable to attempt to purify mingled sewage and storm water, it would seem desirable that the borough should reconsider its sewer plans and provide separate conduits for the sewage and separate drains for storm water, possibly both structures being put in the same trench, the drains nearer the surface, whereby all of the sewage of the borough shall be intercepted and discharged at one or more points on the north side of Pisgah Mountain in the valley of Panther Creek, so that the borough's sewage may be delivered, if desirable at some future date, to disposal works in said valley.

Practically all of the land in and surrounding Summit Hill and Panther Creek is owned or controlled by the Lehigh Coal and Navigation Company. It is reported that this company would object to the discharge of sewage into any of its mines, but it is understood that no objection would be interposed by said company to the conducting of Summit Hill sewage in a properly constructed pipe to and its discharge into some one of the acid tributaries of Panther Creek.

It is further reported that the project of collecting all of the borough's sewage to some point in Panther Creek valley has been given consideration and that in this connection the project of establishing automatic electric pumping stations, to raise the sewage from the drainage districts in the south of the town over into the districts in the north part of the town is being studied.

It has been determined that the interests of the public health demand that the borough of Summit Hill be advised, and such advice is hereby and herein given, to reconsider the sewer plans and to devise a system whereby no sewage whatever shall be discharged into the Mauch Chunk Creek basin but shall have an outlet into the Panther Creek basin and be adapted to the treatment of the sewage from the system at the time when, in the opinion of the Governor, Attorney General and Commissioner of Health, it shall be necessary in the interests of public health for the borough of Summit Hill to purify its sewage by artificially constructed works; said plans to be submitted to the State Department of Health for approval.

In this work of re-devising the plans, the Department will be glad to advise and consult with the local health authorities and the borough officials.

Harrisburg, Pa., June 10, 1907.

TAYLOR, LACKAWANNA COUNTY.

This application was made by the borough of Taylor, Lackawanna county, and is for permission to extend the sewer system and to discharge the sewage therefrom into Keyser Run, a tributary of the Lackawanna River, within the limits of the borough.

It appears that the borough of Taylor is located near the southerly boundary of Lackawanna county, on the west side of the Lackawanna River immediately south of the city of Scranton. It is bounded on the north by Scranton and a portion of Lackawanna township, on the east by the Lackawanna River, which separates it from a part of the city of Scranton, and from Lackawanna township, and from a part of Moosic borough, on the south by the borough of Old Forge and on the west by Ransom township. The territory so incorporated comprises an area of about five and a half square miles and contains all told a present population of seventy-five hundred. In nineteen hundred, the population was four thousand three hundred and fifteen. The main built up portion is in the south-eastern part near the river and covers an area of about one hundred and ten acres, in which resides in the neighborhood of twenty-one hundred people. The remaining part of the population is divided between the

various mining settlements in the central and northern parts of the territory principally at the colliery villages known as Pyne, Archbald and Feltsville. In the south-east corner of the borough is the village of Rendham, partly in Taylor and partly in Old Forge borough. The detached portion of Lackawanna township to the north, known as Lincoln Heights, is to all practical purposes a part of the city of Scranton and may eventually become annexed to the city.

The Delaware, Lackawanna and Western Railroad follows the river in the eastern part of the borough and between it and the river are the tracks of the Central Railroad of New Jersey. Immediately west of it is the main village, formerly known as Taylorville. It is the portion of the borough in which the principal residences are located and the stores and offices. The principal thoroughfare, called Main street, is laid out on the hillside parallel with the general course of the river and distant therefrom about five hundred feet at the nearest point. Most of the dwellings are on the hillside west of this thoroughfare. A few short streets extend easterly to the edge of the river bank and here and along the railroad in the valley are the silk mills. The Economy Silk Company has a mill on Cooper street where are employed sixty hands. Victoria Silk Mill, employing one hundred and fifteen hands, is located at the foot of High street. The works of the Taylor Silk Company and Taylor Worsted Company, employing one hundred and twenty-five hands and sixty hands respectively, are located farther up the valley on the flats near Keyser Run between the tracks of the Delaware, Lackawanna and Western Railroad and the Central Railroad of New Jersey. The mining of coal is the principal industry. There are at least eight large coal mine operations within the borough, employing, so it is reported, five thousand nine hundred and twenty-five men.

Keyser Run is a small stream rising in the northern part of the city of Scranton and flowing about two and four-tenths miles southerly in said city and two and two-tenths miles through Taylor borough to the Lackawanna River, which it joins about midway of said borough. Its water shed comprises an era of eight and three-quarters square miles, of which four and forty-five-hundredths square miles are in the city of Scranton, two and two-tenths miles in Ransom township and two and one-tenth square miles in Taylor borough. The stream receives some sewage in the city, so it is reported. It also receives mine drainage from the Archbald, Sloan and Central, Continental, Hampton, Hyde Park, Holden, Taylor and Capouse Collieries, together with sewage and surface drainage from the various settlements connected with these collieries. It also receives the sewage from the business and residential portion of Taylor borough.

Ascension Run, which drains the western section of Taylor borough, rises in Ransom township on the slopes of Bald Mountain and flows southerly through Taylor and Old Forge boroughs to the Lackawanna River, draining an area above the southern boundary of Taylor borough of about five square miles, of which over fifty per cent. lies within said borough. It receives the mine drainage from Pyne Colliery and mining camp and also from several mines and camps in Old Forge borough. The public water supply is furnished by the Taylorville Water Company, a corporation subsidiary to the Spring Brook Water Supply Company. The mains lead to all the vilages and collieries within the municipal territory. The source is from mountain springs and streams in Spring Brook township and is thought to be unpolluted.

The general sanitary conditions appear to be superior to those of many mining towns. The principal streets have sewers in them, gutter water is admitted to the system and thus kitchen drainage from unsewered houses finds its way eventually into the underground conduits. Surface privies abound but since the soil is gravelly, percolation of the liquid contents is reasonably satisfactory. The unlerlying rock is sandtsone, which in turn is underlaid by the coal measures of the districts. The mining operations reduce ground water, so that the public supply is resorted to almost entirely because of absence of wells or springs.

The main portion of the public sewer system was first installed in nineteen hundred and two. It now comprises a total length of ninety-five hundred feet, of which about seventeen hundred and fifty feet of sewer have been laid thirty inches in diameter, twenty-four hundred feet twenty-four inches, five hundred and thirteen twenty inches, four hundred feet fifteen inches, twenty-two hundred and fifty feet twelve inches, eleven hundred and sixty feet, ten inches and the balance, about one thousand feet, eight inches in diameter, The outlet is twenty-four inches in diameter and the discharge is into Keyser Run at a point about one hundred and fifty feet above the Delaware, Lackawanna and Western Railroad culvert and the passenger station.

It appears that the sewers were designed to carry off a rainfall of about one-half inch per hour from a tributary area of about one hundred acres and also the domestic sewage. Forty-one trapped inlets are connected with the sewers by a ten inch pipe. These inlets are located at street intersections. Because of the size of the inlet pipes and the choking of the pipes with gravel, and the

clogging of the gutter grates with leaves, it is probable that considerable surface water reaches the streams by way of the street gutters during times of heavy rainfall.

At a point in Main street between Church and Chambers streets, where the slope is nearly flat, the thirty inch line of sewer proved to be inadequate in capacity and therefore it was paralleled by a twenty-four inch pipe, the combined capacity of these two pipes being about forty-five cubic feet per second, while the two sewers discharging into these combined pipes, one being twenty-four inches in diameter in Main street and the other thirty inches in diameter in Church street, have a combined capacity fifty per cent. in excess of forty-five cubic feet per second.

There are reported to be one hundred and fifty-one buildings connected with the sewers, and on the line eighty-seven not connected. In the district intended to be ultimately served by the system there are in the neighborhood of two hundred and sixty privies in use.

There are at least three private sewers emptying into the streams within the borough. One is into Keyser Run from the Delaware, Lackawanna and Western passenger station, another is from the Victoria Silk Mill and a third is a private sewer into the river from Taylor Hospital. This institution is located on high ground between Taylorville and Rendham and back from the river about half a mile. The sewer was constructed during nineteen hundred and six. There is a drain from the low point in Grove street to the river which is reported to receive some house sewage.

The sewers for which application has been made are to be built in two different sections of the town, one in the vicinity of Grove street lying between Main street and the river and the other section on the hillside above Main street.

The Grove street district has a drainage of about eight acres and will discharge into the twenty-two inch sewer in Main street at High street. The proposed sewer will comprise eight hundred and seventy feet of twelve inch pipe and two hundred and fifty feet of ten inch in Grove street to terminate at a low point in the grade of the street where rain water now ponds up. The house lots on the south side of Grove street are low and were originally drained by a twelve inch pipe laid under the street and across the house lots on the north side thereof to the bank of the river. It appears that the borough has no equity in this drain and so the proposed sewer is to be laid to afford facilities for the drainage of the street water at the low point and later to provide sewerage for houses. Inlets are to be placed at the low points and connected by ten inch pipes to the sewer. The twelve inch pipe in High street at the grade proposed will have a capacity of about two and a half cubic feet per second which is less than it should be to remove heavy rainfalls from the eight acres and much larger than is necessary for a sanitary sewer. There is an old water course from the low point in Grove street which the borough could utilize as a location for surface drainage improvements.

The proposed Ridge street sewer, for the hillside district, will drain an area of about fifteen acres and is intended to take the place of an old natural water course originally following down Union street, Pond and Church streets into Keyser Run, but now entering a sewer inlet at Union and Ridge streets, where the pipe is fifteen inches in diameter. The proposed sewer will extend in Ridge street and in an alley to Storris street, with branches in the latter and Washington streets, all ten inches in diameter with a total length of one thousand six hundred and fifty feet. The ten inch outlet in Ridge street is to have a slope of seventy-five-hundredths per cent. with a capacity of about two cubic feet per second. The fifteen acres of drainage area will very frequently yield several times more water than this amount. None of the streets in the district are macadamized. The surcharging of the sewers is assured unless means be adopted limiting the amount of street water that shall find its way into the system.

At the different dates of the Department's inspection in Taylor borough no nuisance was observed at the sewer outlet. This is contrary to the observed fact elsewhere in Pennsylvania where all conditions are similar excepting mine drainage. Undoubtedly the large amount of acid water and culm in Keyser Run exerts a purifying influence on the sewage in the stream. From the eight collieries above mentioned in the valley of Keyser Run, on an average of over ten million gallons of sulphur mine water per day are pumped into said run. To a varying degree these acids are germicidal, and in combination with chemicals in the coal waste effect coagulation and precipitation of organic matter in the stream. It would appear that the deposits of culm along the channel of the stream and in the river, obstructing the natural flow thereof, is attended with greater local annoyance that the discharge of sewage therein. However, during freshets the accumulated coal and sewage refuse is picked up bodily by the scouring currents and carried down stream many scores of miles to points where municipalities draw upon the river water for a public supply. At such times fresh sewage and pathogenic poison may be transmitted to the down stream municipalities and menace public health for the reason

above stated. The sewers of the city of Scranton and of the borough of Throop, Dickson City, Olyphant, Blakely, Winton, Archbald, Jermyn, Mayfield, city of Carbondale and Forest City, all discharge into the Lackawanna River above Taylor borough. Whatever menace there may be to public health because of such discharge of sewage is evidently not materially increased by the small proportion of sewage contributed by Taylor borough, whose contributing population is not over one thousand, while in Scranton city alone there are one hundred and twenty-five thousand people. Apart from the question of public menace, it is well to bear in mind that there is a limit to the amount of sewage which may be put into a stream composed largely of mine drainage, beyond which limit a nuisance is bound to occur. In the event of the cessation of the pumpage of mine water into the streams at the numerous points where it is now emptied, and the delivery of the volume at some one point such as is said to be contemplated in the upper valley (by means of a tunnel which is to drain several mines from which water is now pumped) the conditions which now obtain would be likely to be so changed as to cause nuisances in the streams about existing sewer outlets in some instances.

Prudence dictates that the possibility of a general sewerage project for the interception of the flow of the numerous municipal sewer outlets in the thickly populated part of the Lackawanna River valley, as the most economical and feasible project of caring for the public sewage of the region, should be borne in mind in the preparation of plans for sewerage systems and improvements to existing sewers in the above boroughs. Within the city of Scranton, in that part of it lying in Keyser Run valley, sewers will be demanded and eventually a main might with advantage be laid down this valley to the river, where it might connect with a main valley intercepter, in which the dry weather flow from the various municipal sewers would be collected for proper disposal. There is a community of interest which may well be considered jointly by the State and municipal interests concerned. Should any such project be finally contemplated, or the different boroughs be required to independently make other arrangements for sewage disposal than now in use, some separation at that time of sewage from surface drainage would be absolutely necessary. Therefore, plans for sewer extensions or for new sewer systems should be devised to be adapted to such ultimate requirements. Especially is this so since this will not impose extra cost upon the municipality, but, to the contrary, prove a means of economy as well as efficiency.

It appears that the borough of Taylor has adopted ordinances, provided the money therefor, and let the contracts for the proposed sewers. The sewer districts tributary to the proposed outlet must, owing to the topography, always be small in extent and since the citizens desire to equip their dwellings with modern conveniences, it is in the interests of public health that the sewers should be constructed, more especially since such extension does not involve an increased menace to anyone at this time. But said interests do not require or demand that a permanent right to discharge sewage into the waters of the creek without qualification shall be granted, but, to the contrary, it is clear that now on the eve of the permanent pavement of the street surfaces in Taylor borough, both economy and efficiency and the public health dictate that the local authorities should review the sewerage problem, determine how far the separation of sewage from storm water should be carried and prepare a comprehensive sewage plan for the interception of the sewage of all of the borough territory in Keyser Run and the Lackawanna River, either independently or in conjunction with the sewerage problem of the city of Scranton and other places and submit the plans to the State Department of Health for approval in order that further extensions to the sewer system may be a part of such comprehensive sewerage system whose object shall be the proper collection and disposal of the town's sewage.

It is reported that the assessed valuation of the borough is six million six hundred and ninety-seven thousand dollars and that the present bonded indebtedness is forty thousand dollars, which, if true, leaves a municipal borrowing capacity of over four hundred thousand dollars. So the town is amply able to assume the expense of adequate sewerage improvements. But a few modifications the existing sewer system can be incorporated into a sanitary sewer system, excepting the larger sewers which could be devoted to storm drainage exclusively. A limited amount of storm water might with advantage be admitted to those sewers which a study might show to be adapted for incorporation into the proposed separate system.

It has been unanimously agreed that approval be given, and a permit granted for the proposed sewers, and such approval and permit is hereby and herein granted, under the following conditions and stipulations:

FIRST: All roof water shall be excluded from the proposed sewers; street drainage may be admitted under the condition that if, at any time in the future, it shall be found to be necessary or desirable, in the opinion of the Commissioner of Health to have such drainage or any part thereof excluded from the system, it shall be done.

SECOND: On or before April first, nineteen hundred and eight, the borough shall prepare a plan for a comprehensive sewerage system for the collection and disposal of domestic sewage from the borough territory lying within the valley of Keyser Run and the Lackawanna River and submit the same to the Commissioner of Health for approval; and when such plan or modification thereof is approved all future extensions for such territory shall be made in conformity therewith.

THIRD: This permit to discharge sewage into the waters of the State shall cease on the first day of January, nineteen hundred and ten, provided the other conditions of this permit shall have been complied with. Failure of the borough to file the plans herein called for on or before April first, nineteen hundred and eight, shall operate to terminate State sanction to the discharge of the aforesaid sewage into the waters of the State. If on January first, nineteen hundred and ten, all of the conditions of this permit shall have been complied with, then the Commissioner of Health may extend the time in which the borough sewage may be discharged into the waters of the State, having in mind always the general policy of the State with respect to the disposal of sewage from the various municipalities in the Lackawanna River valley above Taylor borough.

FOURTH: No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

The special attention of the borough authorities is called to the suggestions made herein and to the fact that the Department will be glad to advise and assist the borough in its study of the improved sewerage problem.

Harrisburg, Pa., November 15th, 1907.

TITUSVILLE, CRAWFORD COUNTY.

This application was made by the city of Titusville, Crawford county, and is for permission to extend its sewer system and to discharge the sewage therefrom directly or indirectly into the waters of the State.

The city of Titusville has a system of combined sewers, and the sewage therefrom is discharged into Oil Creek or its tributaries at numerous points, all of which was thoroughly described in a permit issued by the Commissioner of Health in answer to an application of the city of Titusville for permission to extend its sewer system during the year one thousand nine hundred and six.

The Governor, Attorney-General and Commissioner of Health were unanimously agreed with respect to the conclusions reached relative to the said application of one thousand nine hundred and six, and permission was duly granted by the Commissioner of Health to the city of Titusville, whereby, under certain conditions and stipulations the sewer system might be extended. Under this permit said city has proceeded to construct certain sewers and the sewers now proposed to be added to the system may be considered to be extensions of the sewers, for the construction of which permission was given by the State authorities in one thousand nine hundred and six.

It appears that the city of Titusville contemplates paving Main street and possibly others, and it is desirable that sanitary sewers should be laid in all these streets prior to said paving.

It has been unanimously agreed that the interests of the public health require that permission be granted to the city of Titusville and it is hereby and herein granted to said city to extend its sewer system as proposed under the same conditions and stipulations which obtain with respect to the permit issued by the Commissioner of Health to said city for sewer extensions in one thousand nine hundred and six.

Harrisburg, Pa., February 11, 1907.

VERONA, ALLEGHENY COUNTY.

This application was made by the borough of Verona, Allegheny county, and is for permission to extend its sewer system and to discharge the sewage therefrom through existing sewers into the Allegheny River within the limits of said borough.

It appears that the borough of Verona is a manufacturing community of about twenty-seven hundred people, located on the east bank of the Allegheny River nearly opposite, but slightly above, the Allegheny City Water Works intake, one and three-quarters miles above the water works intake of the Pennsylvania Water Company, three and a quarter miles above the city of Pittsburg water works intake and eleven miles above the confluence of the Allegheny and Monongahela Rivers. It is also on the Allegheny Valley Division of the Pennsylvania Railroad. This company has extensive yards and repair shops in the town and gives employment to several hundred men.

The borough is located on a hillside and is bounded on the north by Plum Creek, which separates Verona from the borough of Oakmont, and on the south by Wildwood Creek and on the east and the south by Penn township. The incorporated territory extends along the river for about one mile and back therefrom for about one thousand feet are the flats. In the northern part of the borough on the flats and extending up Plum Creek valley are the railroad shops and yards. In the southern part of the borough there is a strip of land between the railroad and the river, possibly six hundred feet wide, which is subject to flood even in the summer time and all of the flats in the town are inundated during extreme freshets. However, this has not prevented the occupation of the land by dwellings of the less resourceful class and by stores and office buildings. The principal residential district of Verona is on the highlands and it is here that future growth must take place because the land immediately south of the borough is precipitous and unsuitable for occupation. On the top, possibly two hundred feet above the flats and the deep narrow ravine of Wildwood Creek is a plateau under cultivation. At the foot of this hill in Verona is located the plant of the General Steel Casting Company, employing approximately three hundred and fifty hands. It occupies all the land between the slope and the railroad south of Wildwood Creek except the works of the Pittsburg Pole and Forge Company.

A short distance below Verona the flats terminate and there is barely room between the hillside and the river for the location of the railroad tracks.

Plum Creek rises in the table land in Plum township at an elevation of about five hundred feet above the river and comes down easterly through a rural territory, draining several villages and a colliery, a distance of about eight miles to the river. In its valley in Oakmont and Verona there are several industrial plants. In Verona above the Pennsylvania Railroad yards are the works of the Andrews Bollinger Company, makers of structural steel, employing about one hundred and fifty hands, and immediately above it is the Anderson's Planing Mill, employing possibly forty hands. In Oakmont about opposite the Andrews Bollinger Works is the plant of the Verona Tool Works, employing about one hundred and fifty men. All of the industries mentioned are said to be in a thriving condition.

In the year eighteen hundred and ninety, after Oakmont had been incorporated out of part of Verona, the latter place had a population of fourteen hundred and seventy-seven. In nineteen hundred, it had increased to nineteen hundred and four, and this growth has been maintained, the present population being placed at about twenty-seven hundred. Every prospect points to a continued increase in population.

The Suburban Water Company supplies Verona and also Oakmont with water taken from the Allegheny River at the up town end of Oakmont. There is a filter crib imbedded in the channel of the river covered over with gravel and sand from which water is pumped through Oakmont and Verona to a reservoir on top of a hill in Penn township back of Verona, from whence it is supplied by gravity to the townspeople in Verona and to people living in the townships of Penn and Plum.

During the fall of nineteen hundred and five, the water company was compelled to enlarge its plant to meet the rapid growth in population in the two boroughs and the two townships, which it did by laying a new crib in the river and installing a new pumping engine. It is also reported that water mains have been extended in the streets, all of which has been done without approval by the Commissioner of Health, as required by law. The water company has submitted a report and filed plans of its system, but these plans do not give the details of the reservoir or of the street pipe system or pumping plant sufficiently to enable the Department to determine what the drainage facilities of the system are and how to cope with an epidemic in the district, were one to prevail of a water borne character. Doubtless the water company would cheerfully conform to any request for information which the Department might make. On September ninth, one thousand nine hundred and five, the superintendent of the Suburban Water Company notified the State Department of Health that said company obtains its supply of water from the Allegheny River a short distance north of Halton Station on the Allegheny Valley Railroad, and that the company was about to install an additional filter crib, and asking to be advised if a permit for such additional filter crib be necessary, and relative to any other legal formalities required by State Law respecting such matters. The work was done, however, without a permit.

In the district supplied by this company there has been a large amount of typhoid fever. For the first six months in one thousand nine hundred and seven, in Verona there have been reported to the State twenty cases of typhoid fever and in Oakmont twenty-nine cases. For the year nineteen hundred and six there were reported eighty-eight cases in Oakmont and but eight cases in Verona. Evidently physicians in the latter place neglected to conform to the law requiring morbidity reports to be made to the municipal health board.

Analyses of samples of water collected from the public system at various times have shown the presence of intestinal organisms and the public relying on this supply of drinking water has been warned through the activities of the Board of Health of Oakmont to drink boiled water only.

While the public water supply is availed of quite generally, some drinking water is obtained from private sources in the borough. Along the road in Wildwood Creek ravine there are a number of houses using wells. These wells are near the road and the foot of the slope, on which slope are numerous privy vaults sunk in gravelly soil and in close proximity to the wells.

In the central part of the borough, between First and Second avenues, there are several houses not yet connected with the sewer system, privies and wells being located near each other on these properties.

At the Andrews Bollinger Company's plant there is a large spring on the hillside which is the source of supply. The spring itself is walled up and closed over, a pipe leading from it to a half barrel nearby where residents in the vicinity on the highlands above are said to come and fill water pitchers. From this barrel the water is piped to a tank and thence to the works. Unless sewage is properly disposed of at the properties on the hill above the spring, there is a possibility of surface contamination and sub-surface pollution.

The General Steel Casting Company obtains water from a very small run fed from springs in the hillside just back of their plant. This water is used in their boilers in preference to the corrosive waters of the borough supply. The employees drink the spring water and it is also furnished to their tenant houses, accommodating twelve families. The water shed is unpopulated, excepting one farm house, and it should be an easy matter to protect this supply.

The built up part of Verona is quite thoroughly sewered on the separate plan. Separate conduits for the removal of roof and storm water and street drainage are provided. The outlet of the main sewer system is into the river at the foot of Fairview avenue, which is down stream about four hundred feet below the mouth of Wildwood Creek and up stream about eighteen hundred feet from the southerly boundary of the borough where there is the second public sewer outlet. This is eight inches in diameter and it serves a local district on the flats and the General Steel Casting plant, comprising all told twenty-two hundred feet of eight inch sewer. This district system is completed and apparently will not require any extensions.

The main sewer outlet is twenty-four inches in diameter and it serves a total length of about six miles of pipe, sewers being of recent construction provided with flush tanks, inspection manholes and apparently efficiently performing work of removing the sewage of the village into the river.

The local authorities have required owners of property abutting the sewer to connect therewith quite generally so that the number of privies in Verona is relatively small. It is reported that there are no cesspools in use.

There are two storm sewers discharging, one into the river at James street (a four foot brick sewer) and the other discharging into Plum Creek at Front street. It is twenty inches in diameter.

In addition to the public sewers there are various private sewers in the borough. Along Arch street on the flats abutting the river the buildings either have private sewers to the river for sewage or kitchen waste, or on the properties there are privies along the banks of the river so situated that at an ordinary high stage the water floods the vault and becomes contaminated by the excrement. During the summer of nineteen hundred and six this flooding to a depth of from two to six feet occurred several times. There is a sewer in Arch street and there appears to be no good reason why the abutting estates should not be connected with said sewer.

There is a twenty inch private sewer to Plum Creek from the railroad company's repair shops.

Immediately below this sewer there is another one in Plum Creek owned and maintained by the borough of Oakmont. It is thirty inches in diameter. Still further up stream a private sewer from the Andrews Bollinger works, reported to receive sewage, discharges into the creek.

Above Verona, Plum Creek receives the mine drainage from at least one colliery, and the color of the stones on the bottom of the stream is characteristic of water courses into which waste waters from coal mines are emptied.

The borough purposes to extend a ten inch sewer up Wildwood avenue in the ravine by the houses now located there, and then up Church street and alleys, and in Third avenue and alley in rear to South avenue, comprising in all about twenty-four hundred feet of eight inch sewer and thirteen hundred feet of ten inch sewer. Also an eight inch sewer extension in Jones street to admit of the abatement of nuisances caused by privies in the vicinity of the Pittsburg Pole and Forge Company works. This extension will amount to about six hundred feet in length.

Owing to the source of the public water supply of Verona, it may be expected that typhoid fever will continue to prevail at least until two things shall have been accomplished, namely, the filtration of the said supply and, second, the

diminution of the pollution of the Allegheny River by sewage above the Suburban Water Company's intake. The latter work is being gradually accomplished by the State Department of Health and is essential because the most advanced processes of water purification do not afford absolute insurance against infection of the drinking water in cases of accident or careless operation of the filter, when the source from which the raw water is obtained contains pathogenic poison.

Reliance upon a filter crib sunk in the bed of a river is likely to prove disastrous to those drinking the water drawn from such a crib. Even where apparatus for water purification is built to admit of all possible regulation and manipulation, constant care must be exercised to secure a high and safe degree of efficiency, so that it should be readily apparent that an apparatus like a filter crib which is not subject to control, is totally unsuited to afford insurance to the public health to the extent that water consumers may drink the water without risk of contracting disease.

The injunctions of the Oakmont Board of Health to boil the water, and it may be that the Verona Board of Health has issued similar warnings, should be heeded. The discharge into the Allegheny River of sewage, especially immediately above Oakmont, menaces the lives of the public in the Verona district and must cease. In turn those municipalities and the public relying for drinking water upon the Allegheny River and living below Verona must be protected, and in considering the question broadly the State authorities cannot consistently permit Verona or Oakmont to defile the Allegheny River while requiring up stream municipalities to discontinue such defilement. The poison emitted from Verona sewers into the river within three and a quarter miles of and above the water works systems supplying half a million people, may be introduced into the pipes of any of these systems and be drank and start upon its work of destroying human life within less than an hour from the time the poison leaves the body of the individual using the Verona sewerage system.

The assessed valuation of Verona is reported to be one million seven hundred and eighty-three thousand two hundred and forty-five dollars, which, if true, leaves a borrowing capacity of about fifty-two thousand dollars, which is a sum amply sufficient to more than provide under all ordinary conditions for the installation of a municipal sewage purification plant of the size demanded in the interests of public health at Verona.

While the proposed sewer extension will do away with the two worst nuisances in the borough, namely those existing along Wildwood avenue and those in the vicinity of Jones street, (provided the borough authorities compel the abandonment of all privies and the connection to the public sewer system in these localities), and the public health seems to demand these improvements, and the amount of sewage to be contributed by the said proposed extensions will not measurably increase the present sewage pollution of the river in Verona, because most of it goes to the river sooner or later now, yet in order to accomplish the best results the sewer system should be extended to embrace all sewers in the borough and every property should be compelled to connect in order that all sewage, whether from dwellings or industrial plants, should be conveyed by the public sewer system eventually to the sewage purification plant. Therefore, in anticipation of the treatment of the sewage, all roof and storm water should be excluded from private connections to the public system.

Since one of the main outlets of the Oakmont borough sewer system discharges into Plum Creek, and in the study of the most important question of the selection of a secluded site for a sewage purification plant for the treatment of Oakmont's sewage it might be found very desirable for Oakmont and also for Verona to unite in a combined or joint intercepting system and disposal works, the attention of the local authorities of both municipalities might well be called to the possibility.

It has been determined that the interests of the public health demand that a permit be granted and it is hereby and herein granted to the borough to extend its sewer system under the following conditions and stipulations:

FIRST: That all storm water shall be excluded from the sewers and that sewers may be generally extended throughout the borough from time to time as necessity may require and that at the close of each season's work plans of the sewers laid during the year, together with any information required by the Commissioner of Health in relation thereto, shall be filed in the State Department of Health.

SECOND: The borough authorities shall compel the owners of estates abutting a public sewer whereon a nuisance exists or a menace, or from which a private sewer discharges into any river, creek, or natural water course, to connect such property with such public sewer and to discontinue the discharge into any of the waters of the State.

THIRD: It at any time in the opinion of the Commissioner of Health the public sewerage system, or any part thereof, is a nuisance or prejudicial to the public health, then the borough authorities shall adopt such remedial measures as the Commissioner of Health may advise or approve.

FOURTH: This permit is issued under the express stipulation that on or before January first, one thousand nine hundred and eight, the borough shall prepare a plan for the collection of all of the sewage of the borough and its conveyance to and treatment in a sewage purification plant, together with a plan and report on such sewage disposal works, and submit the same to the Commissioner of Health for approval. When approved, modified or amended, the said Commissioner will fix a time when such works shall be built, during which the public sewerage system may temporarily discharge into the Allegheny River.

FIFTH: No pathological material from any laboratory shall be discharged into the public sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

The Board of Health of Verona will be advised and notified to warn the public to drink boiled water only and that such board shall cause the abandonment of all wells in the borough the waters of which may be under suspicion or found by tests to be prejudicial to public health.

The public in the townships will also be notified of the suspicious quality of the water supply and be warned to boil the water.

The Andrews Bollinger Company will be requested to cut off surface drainage from the spring supplying their plant and properly enclose the open tank or cask to prevent animal or other careless contamination of the water.

The General Steel Casting Company will be requested to make a monthly inspection of the water-shed and the farm house and promptly report to the State Department of Health any nuisance or menace thereon. All of the buildings on this company's property should be connected with the public sewer and the use of outside privies discontinued.

Harrisburg, Pa., August 14th, 1907.

VERSAILLES, ALLEGHENY COUNTY.

This application was made by the borough of Versailles, Allegheny county, and is for permission to construct the proposed sewers.

It appears that the borough of Versailles is located on the east and north banks of the Youghiogheny River, about three and one-quarter miles above its junction with the Monongahela River and sixteen miles south-east of Pittsburg on the Baltimore and Ohio Railroad. It is surrounded by Versailles township and about one-half miles below is the southerly boundary line of McKeesport City, which city extends northerly along the river to the Monongahela and draws its water supply partly from the Youghiogheny and partly from driven wells. The State Department of Health has approved plans for a water-softening and filtration plant for the purification of the entire public supply, which is henceforth to be drawn from the river. The intake is in the neighborhood of one mile down stream from the outlet of the proposed sewer system of Versailles borough.

The borough's incorporated territory comprises about two hundred and sixty acres, of which about two hundred acres are located on a steep hillside and drain to the river; the remainder sloping towards Long Run which forms the northerly boundary of the municipality and empties into the river in the strip of Versailles township separating the borough from McKeesport. The part of the township adjacent to the borough is built up or occupied by industrial plants and to appearances is borough territory. In Versailles proper there is located the galvanizing plant of the National Tube Company, employing eight hundred men; also the Versailles Railway Signal Company, employing forty men.

According to the census of the year nineteen hundred, there was a population of eight hundred and seventy, which has increased to about one thousand at the present time. The built up portion is on the river slope. There is a small amount of flat land in the valley between the railroad and the river. Surface water reaches the railroad from the hillsides very quickly and passes through culverts under the tracks to the river. These culverts are located at natural water courses, which have no flow during dry times except that rising from artificial sources.

The inhabitants derive their water supply wholly from private wells, most of which are driven into sand and gravel to a depth of from thirty feet to sixty feet below the surface of the ground. During the year one thousand nine hundred and six, there were four cases of typhoid fever, two of which were thought to have been caused by the pollution of the local ground supply. The surface hardpan of clay in the borough is reported to average about seven feet, shallow earth privies abound, many of which are overflowing, sink and wash water from the houses is disposed of either broadcast on the ground, or, as is the principal custom, into the street gutters, and, therefore, unless the driven wells are well protected there is danger of pollution of the ground supplies from surface drainage. Judging from the generally low standard of sanitation manifest throughout the borough, carelessness respecting proper maintenance of the apparatus used for drawing the drinking water from the ground in the borough would obtain.

There are existing in the borough numerous storm drains, from twelve to eighteen inches in diameter, laid in the street gutters two or three feet deep to serve the purpose of facilitating drainage at one particular point. None of these conduits extend under the railroad or to the river, and there is no system. The streets have never been granded, hence their surfaces have never been paved and the buildings were apparently located without regard to a future drainage plan.

The industrial plants are located on the river front or at the railroad, and drains therefrom discharge sewage and other wastes into the river. At the National Tube Company's works an artesian well supplies drinking water and for industrial purposes river water is used after being filtered, or otherwise treated. The Youghiogheny is an extremely acid stream, due principally to mine operations in its basin which comprises an area of over two thousand square miles. While the waters of this stream are known to receive large quantities of sewage, bacterial tests do not show the presence of many organisms of sewage origin, owing probably to the germicidal action of the acids contributed from the mines. For industrial purposes filtration is employed to clarify the waters and chemicals are added to render the water soft.

The Versailles Railway Signal Company uses artesian well water for all purposes at its plant.

The main street of the borough parallels the river about half-way up the hillside, has a double track trolley road and leads to the highway bridge known as the Boston Bridge, over the Youghiogheny River to Elizabeth township. The better class of residences are on the hill above this street. The proposed sewers will not reach this territory, nor more than one-half of the land between Main street and the river, so that about three-quarters of the land in the borough sloping to the river would not be specifically benefitted by said sewers.

The plan submitted shows a four foot brick sewer from the river up Juniper street under the railroad to First street, thence an eighteen inch pipe in Juniper street to Third street and a fifteen inch pipe in Juniper to Walnut street. Also a fifteen inch pipe in Third street from Juniper to Wampler street. The aggregate length of all these sewers is twenty-one hundred feet. A contract for this work has been let for the sum of seven thousand dollars, subject to the condition that a permit be granted by the State Department of Health.

The proposed sewers are to receive sewage and storm water, and the point of discharge into the river is about one thousand feet above the down stream borough line.

The following petition has been filed in due form in the Department. It was received on March fifteenth, one thousand nine hundred and seven.

"To the Honorable Samuel G. Dixon,
"Commissioner of Health,
"Health Department, Harrisburg, Pa.

"We, the undersigned petitioners, being citizens and taxpayers of the borough of Versailles, in the county of Allegheny, Pennsylvania, respectfully request:

"That you withhold your approval for the construction of a sewer in the aforesaid borough, as provided for by Ordinance of the council of said borough, a copy of said ordinance being hereto attached, for the following reason:

"The borough of Versailles at the present time does not have a single paved street, lane or alley within its corporate limits, and past experience has shown that sewers constructed before the streets are improved are, after a very short time, of no practical use for the reason that during heavy rains the soil from the streets is washed into the sewers and they become stopped or clogged.

"The borough of Versailles does not have any water works of its own, nor is it supplied with water by any independent company and therefore would have no means whatever for flushing out said sewer if the same should be constructed.

"We also protest against the approval of this contract by you for the reason that council and the committee thereof have awarded the contract not to the lowest responsible bidder, as required by law, but to a company whose bid exceeded that of other responsible contracting companies in the sum of twenty-two hundred and fifty ($2,250.00) dollars. Said amount being equal to one year's tax levy of the entire borough. Bowman Brothers, one of the bidders on said work, whose bid was $2,250.00 lower than the bid of the company to whom the contract was awarded is an old responsible and well known contracting firm that has done hundreds of thousand dollars worth of contract work for the city of McKeesport and other municipalities in western Pennsylvania."

It is reported that the borough has a total valuation approximating five hundred and fifty thousand dollars and that there is no municipal debt. Its borrowing capacity, therefore, is slightly under forty thousand dollars, a sum insufficient to provide combined sewers for the entire built-up borough territory sloping towards the river. The proposed sewers have a total length equivalent to one-twelfth of the total length of public streets, not including alleys, where sewers are needed. The sum is also insufficient to provide for the erection of

sewage disposal works to treat sewage and storm water for the proposed sewers. The fact that it is the policy of the State to diminish the amount of sewage discharged into the waters under State control, coupled with the fact that the proposed sewer outlet is in the immediate vicinity of and above the intake of the city of McKeesport water works system, predetermines that Versailles sewer system should be designed in anticipation of the erection of sewage disposal works. There is no known method of sewage purification economically adaptable to the treatment of both sewage and storm water. Especially at Versailles, where the need of sanitary sewers is general throughout the entire built-up section of the borough and where the amount of money obtainable is limited and where the sewage must be treated eventually, should foresight be exercised and prudence govern the design of the sewers. Not only is the cost of extending combined sewers into all of these streets in the borough prohibited, but the treatment of the flow of such sewers would be impracticable. The petitioners have not shown the necessity for a general underground storm water conduit system, but necessity does exist for a general sanitary sewer system. The cost of the latter is well within the financial means of the borough and the local authorities can establish such a system bringing the benefits of the money thus expended to the entire community and at the same time lay out the system in a manner best adapted to the treatment of the sewage when the erection of sewage purification works shall become necessary.

In order that the borough shall be able to compete with other municipalities in the Pittsburg districts, adequate systems of public water works and sanitary sewerage will have to be provided. So long as the methods of sewage disposal are continued in Versailles, the purity of the ground water supplies there will be menaced. But until a public system of water works is installed, the source of supply must be from private wells, and to safeguard them as much as possible, all household drainage should be removed speedily from the premises in a system of underground pipes or by some other sanitary method.

It has been determined that the interests of the public health demand that permission be denied for the construction of the proposed sewers, and that the local authorities be advised to employ a competent engineer to devise a comprehensive system of sanitary sewers and sewage disposal works for the entire borough, and that the borough submit such plans, with a report, to the Department of Health for approval; which denial and advice is herein and hereby decreed.

It has also been determined that the local municipal authorities be notified and they are herein and hereby notified of the suspicious quality of the private well water, and advised that the only safe course to pursue is for the citizens to drink and use for culinary purposes only such water as has been boiled for thirty minutes.

Harrisburg, Pa., June 26, 1907.

WALL, ALLEGHENY COUNTY.

This application was made by the borough of Wall, Allegheny county and is for permission to install a sewer system and to discharge sewage therefrom untreated, into Turtle Creek, within the limits of the township of North Verseilles, said county.

It appears that the borough of Wall is a small residential community of about two thousand population, located in the valley of Turtle Creek on the south side thereof and surrounded on the north, east and south sides by North Versailles township and on the west by a portion of Wilmerding borough. The incorporated territory is separated from Turtle Creek by a small strip of land in said township, which said strip is owned and occupied by the Pennsylvania Railroad Company's main line and yards and shops, which are extensive and wherein are employed about fifteen hundred to eighteen hundred men. The borough of Pitcairn is located on the opposite side of the creek and Wilmerding is situated on both the north and south banks. The main line of the Pennsylvania Railroad passes through the latter borough, in which there is a passenger station, the distance being about fifteen miles east of Pittsburgh. There is no depot in Wall; it is just east, in North Versailles township opposite Pitcairn borough.

The citizens depend mainly upon the railroad company for employment.

The built-up portion of the town is confined to a strip of land about five hundred feet wide along the railroad. Back from this the slopes are generally steep, ascending about four hundred feet to the hill summits, which are practically unoccupied. There are three runs coming down from the south to the creek, the principal one being in the vicinity of Valley avenue. The second is east of the first, following Seeley avenue, and the third is in the west part of the borough, at Coal street. There are a few houses in the valley of the first two runs.

The streets are unimproved and have plank sidewalks, or none at all. The general appearance of the borough is not now attractive and public improvements are demanded. There are numerous low lots in which water pools and becomes stagnant. The water supply is obtained from private wells and a few springs. Most of the wells are dug, though a few are bored and cased. Opposite the public school on Versailles avenue, an iron pipe has been driven into the rock of the hillside and the water flowing from this pipe is extensively used by the people in the neighborhood. Other springs reported to be on the hillsides above the houses are also reported to be free from any permanent danger of contamination.

The general method of disposing of kitchen waste is into the street gutters or on to the ground in the yards. Pollution of well water may have been the cause of some of the cases of typhoid fever. The East McKeesport Water Company has a franchise covering this district and contemplates extending its system to the dwellings in Wall. In the year nineteen hundred and six there were eleven cases of typhoid fever in the borough and to the first of September, nineteen hundred and seven, three cases.

The existing sewers consist of a small system constructed by a land company and now owned by the borough, located in the central part of the village in Versailles avenue, Moss Side avenue and Hampton street. They discharge into a run which comes down through Seeley avenue where said run crosses Moss Side avenue. The sewers comprise, all told, thirteen hundred feet of eight inch pipe; seven hundred and twenty feet of ten inch pipe; and one hundred and fifty feet of twelve inch pipe. The outlet is covered by an accumulation of gravel. It is estimated that about one hundred people use these sewers.

The design submitted provides for a system of sanitary sewers covering nearly all of the borough and discharging into Turtle Creek at three points in North Versailles township, each being a twelve inch outlet and one being located in the extreme eastern part of the borough, the other in the central and the third in the western part, each at a point where there is now a culvert or water course under the railroad to Turtle Creek.

The elevations of the proposed sewer outlets are not shown on the map, but from an inspection made on the ground it would appear feasible to construct an intercepting sewer along the railroad right-of-way, to collect the sewage from the said outlets and convey it to the western part of the borough to some common point.

The sewer design seems to be well proportioned, but manholes are not always placed in changes in line and grade.

The petitioners do not contemplate the construction of but a small part of the total number of miles of sewers in the proposed district, which approximates forty-three thousand lineal feet. The municipality's financial resources permit only limited expenditures. It is reported that the assessed valuation is seven hundred thousand dollars, and that there is a school debt of eleven thousand dollars. It is proposed to issue bonds to cover the cost of the sewer and street improvements contemplated. Apparently the borrowing capacity is somewhere in the neighborhood of forty thousand dollars, a sum insufficient to provide a modern system of sewerage and sewage disposal, and street and other improvements besides. Therefore, the local authorities should be especially commended for having laid out a comprehensive sewerage system for the entire borough in order that no part of the sewers needed now should be torn up or abandoned in the future, but that all may finally become a perfected system.

It appears that the sanitary conditions of Wall are in need of improvement, and the present effort to secure sewers and water works and better transportation facilities and paved streets is encouraging, and, if persisted in, should result in benefit to the public health.

Turtle Creek, into which the borough wishes to discharge the sewage untreated, has a drainage area of about one hundred and fifty square miles, of which about one hundred and twenty miles are tributary to the creek above Wall. The stream receives a considerable amount of mine drainage, which is estimated to be fully one-third of the total flow in summer time. The sulphur contents of the waters possess germicidal properties but how effective this may be under varying conditions of flow of stream and mine drainage has not been determined for Turtle Creek, although it is considerable no doubt at times. Below the borough of Wall, no use is made of water from Turtle Creek except for condensing at manufacturing plants in Wilmerding, Turtle Creek and East Pittsburgh boroughs. Approximately four miles below Wall, Turtle Creek flows into the Monongahela River and about three and one-half miles below this junction, the borough of Homestead is reported to have an emergency intake by means of which water is drawn from the river when the supply from the wells is insufficient.

The creek and its tributary, Brush Creek, receives sewage from the boroughs of Jeannette, Irwin, Trafford City, Pitcairn, Wilmerding, Turtle Creek and East Pittsburgh, and also from manufacturing plants located therein. The ag-

gregate population of these places is over thirty thousand. During periods of dry weather, below Trafford City borough, there are various pools along the creek in which sedimentation is promoted, and here, no doubt, some sewage is deposited. The Turtle Creek valley is very likely in the future to be thickly populated with residences located on the hillside and it is entirely possible that within a few years, if the sewage from the rapidly increasing population of the region were discharged into Turtle Creek, that the diluting ability of the stream would become overtaxed and a nuisance be created. Such a result should be prevented and may be by a judicious expenditure from time to time of monies for sewers, according to a plan which, keeping pace with the growth of the region, shall ultimately require the treatment of the sewage before its discharge into the creek.

There are at present, no industries in Wall, but the borough of East McKeesport, located on the summit hills south of Wall, has requested approval of plans for a trunk sewer down the valley and the highway called Valley avenue in Wall, to Turtle Creek. The run here drains the largest part of East McKeesport and it is the natural outlet for said borough's sewage. The Commissioner of Health has withheld a permit for such a sewer and has stipulated "That not later than June first, 1908, the borough shall prepare and submit to the Commissioner of Health for approval plans for a system of sanitary sewers for the entire borough, and for the proper disposal of the sewage thereof, either independently, or in conjunction with the borough of Wall, or other municipality; and for this purpose the local authorities are advised to engage the services of a consulting engineer to assist the borough engineer in laying out such a comprehensive system of sewage and sewage disposal."

It is evident that if one municipality be permitted to permanently discharge its sewage into the stream, then in justice, all of the municipalities in Turtle Creek drainage area should be permitted to do likewise. Besides the prevention of a nuisance in Turtle Creek, it is the bounden duty of the State health authorities to preserve the purity of streams used as sources of public water supply. The Ohio River within Pennsylvania is such a source for many municipalities, and this is an added reason why the borough of Wall and every other place along Turtle Creek should plan to eventually discontinue the discharge of sewage into the waters of the State.

There is a narrow tract of land in the western part of the borough west of Coal street, where sewage disposal works could be located. It would be necessary to raise the sewage by pumping. The boroughs of Wall and East McKeesport might, if they saw fit, promote a joint disposal plant here, if this should be found to be desirable. There are other tracts of lands which might be utilized for these or other municipalities; and finally, the formation of a sanitary district comprising the boroughs and parts of adjacent townships in Turtle Creek valley might be desirable and prove to be the most efficient and economical solution of the problem in the end. Such a method would involve a joint intercepting sewer in the valley and one disposal works for all places, each municipal sewer system being built and owned independently, but so arranged as to form a part of the joint trunk sewer and disposal works.

It has been determined that the interests of the public health demand that approval be given and is hereby and herein given to the proposed plans for the sanitary sewer system and for the discharge of sewage therefrom, untreated, into Turtle Creek under the following conditions and stipulations:

FIRST: That an inspection manhole shall be placed at every change in line and grade of a sewer and that the existing sewers shall be thoroughly cleaned of all deposits and shall be put in a good condition before being incorporated as a part of a new system.

SECOND: At the close of each season's work, plans and profiles of the sewers built during the year, together with any other information in relation thereto which may be desired, shall be filed with the State Department of Health.

THIRD: If for any reason the sewer system or any part thereof be found to be unsanitary or injurious to the public health, in the opinion of the Commissioner of Health, then such remedial measures shall be adopted as said Commissioner may advise or approve.

FOURTH: No pathological material from any laboratory shall be permitted to be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

FIFTH: This permit to discharge sewage into the waters of the State shall cease on the first day of June, one thousand nine hundred and eight; but if the borough shall have complied with the other conditions of this permit, and, on or before said first day of June, one thousand nine hundred and eight, have prepared and submitted for approval a plan for the interception of the sewage from the proposed outlets in the borough and for the treatment of the borough sewage, either independently or in conjunction with the borough of East McKeesport, or other municipality, then the Commissioner of Health may extend the time in which raw sewage may be discharged into the waters of the State.

SIXTH: The borough council shall by ordinance or otherwise prevent the continued discharge of household wastes upon the streets and alleys of the town. Wherever a sewer is provided, the occupied estate should be connected therewith.

SEVENTH: All storm water is to be excluded from the system.

The attention of the local authorities is especially called to the fact that several of the municipalities in Turtle Creek valley have applications for sewer extensions now pending in the Department of Health, and that said Department will be glad to co-operate and advise with each and every one with special reference to projects for the ultimate discontinuance of the discharge of sewage into Turtle Creek.

Harrisburg, Pa., November 2nd, 1907.

WARREN, WARREN COUNTY.

This application was made by the borough of Warren and is for permission to extend its system of sewers and to discharge its sewage therefrom, untreated, into the Allegheny River within the limits of said borough.

It appears that the borough of Warren is the seat of government of Warren county. It is a substantial, prosperous old town of about ten thousand population, beautifully located on the banks of the Allegheny River about one hundred and fifty miles above Pittsburg. The contributing territory produces natural gas and oil, and among the several industries in the municipality are several oil refineries. Manufactural wastes from acid, chemical and glue works reach the streams within the corporate limits by direct connection, not through the public sewers.

The Allegheny River divides the town into north and south districts and the Conewango Creek, which comes down from the north joins the river in the centre of the town, sub-divides the northern part into an east and west Warren. The business and oldest part of Warren is in West Warren on the high plateau bounded by the creek and the river to the Pennsylvania Passenger Station. The remaining down stream part of the western district and all of south Warren are flats built upon but flooded at times of high water in the river. There is also a fringe of lowland along the creek and river in east Warren which is subject to annual inundation.

Except in the cases where water is drawn from private wells, of which there are about three hundred and fifty scattered about in the town, principally in the outskirts, the water supply is furnished by the Warren Water Company, one of the constituent plants of the American Water Works and Guarantee Company of Pittsburgh. The supply consists of a mixture of surface and well water. The surface water is collected by a small intake dam on Morrison Run, a mountain stream located in Mead township, Warren county, about six miles from the borough. The ground water is secured from five driven wells located on an island opposite the central part of the borough at the confluence of the Allegheny River and the Conewango Creek. The wells are driven through glacial strata consisting of alternate layers of fine and course gravel and hardpan to an average depth of about sixty feet, where an ample supply of water is secured.

The surface supply is fed to the town by gravity. The ground supply is pumped continuously into the pipes of the town. There is a distributing reservoir on the hill in which about one million gallons of ground water are stored and turned on to the system in case of fire.

Although the sewage from a majority of buildings and residences in Warren is discharged through sewer outlets into the streams, there are still in use numerous cesspools and privies in proximity to shallow dug or driven wells, some of which are said to be seriously contaminated. Analyses of water drawn from deep driven wells do not show the presence of sewage pollution, with one exception only. Eight-tenths of the population are supplied by the water company, yet one-third of the cases of typhoid fever only occur in famliies using this supply exclusively.

For three days beginning April fourteenth, one thousand nine hundred and six, there was an epidemic of bowel trouble, numbering all told about four hundred cases, most of which were not of violent enough character to require medical attendance, although severe enough to make the presence of the epidemic manifest in the community. The outbreak was attributed to impure water since the disease made its appearance coincident with black color and heavy sediment containing in the pubilc water supply. Evidently these foreign ingredients did not come from the ground source. Morrison Run watershed has upon it over thirty oil wells in operation, from which at times waste material is of such character as to be capable of discoloring the water and rendering it black. Sewage pollution of the run is also possible and the Commissioner of Health has condemned this source as unsafe for drinking purposes unless the water be first filtered.

On Friday, December seventh, one thousand nine hundred and six, an epidemic of gastro-enteritis began and continued with severity until Wednesday, December twelfth, numbering over eighteen hundred cases, although a few were noted for over three weeks thereafter. This disease was not prevalent in other places within a radius of sixty miles.

The cases occurred in families where public water was used exclusively, or among those living in the outskirts who drank public water when in town, and were principally located in the old part of the town where ground water was supplied.

Food, milk and the ice supply were investigated by a representative of the Department but were not found to be the medium of transmission. In view of the general distribution, suddenness of attack and virulence of the disease, it was concluded that the public water supply was the avenue of infection. Special investigations of the water company's wells were conducted by the State Department of Health, local authorities and the water company.

Tests showed that the water was satisfactory in quality before the epidemic but contaminated by sewage organisms during the epidemic. The possible sources of pollution were the mill race and river water, sewers on the island and also privies.

All of the dwellings on the island are within a radius of five hundred feet of the pump house wells. There are fifteen such dwellings at each of which there is a privy over a dry earth vault dug in the ground. The soil is porous. The nearest privy is fifty feet distant and six others are so located as to possibly pollute the ground from which the water is drawn, but eight of the fifteen privies are located on the bank of the mill race. There are also six other privies in connection with the shops and manufactories on the island, one of which is within two hundred feet of the wells, but all of them are near the bank of the river or mill race.

The mill race separates the island from the main land. Near the lower end of it a dam was erected years ago for power purposes. The water is diverted into the mill race by means of a dam across the Conewango Creek near the upper end of the island. At low stages of the river the mill race water is about nine feet higher than the river and would naturally filter through the island, which is composed of porous material, towards the river. The sewer outlet of the State Hospital for the Insane is two and one-half miles above Warren and at this point discharges its sewage into the Conewango Creek, thereby creating a nuisance complained of by a large number of people owning property along the creek within the limits of the borough. Much of this sewage in the summer time finds its way into the stagnant mill race basin. Both the water therein and that of the Allegheny River shows evidences of sewage contamination whenever tested bacteriologically.

The elevation of ground water on the island follows the rise and fall of the river as proven by gaugings of the water in the driven wells and in excavations made on the island.

After a review of all of the evidence the Department has determined that the poisoning of the supply which caused the December epidemic came from the surface, from a leaky sewer located in close proximity to wells of the water company, which suddenly developed leaks caused by repairs and alterations made a few hours previous to the rise of the river which flooded the wells and forced the escaping sewage into them in sufficient quantities to thoroughly impregnate the supply with virulent infection.

However, it may be impossible for the sewage waters of the race or river, or the contamination of the ground on the island to cause a pollution of the deep ground waters there, especially when large volumes of water are drawn from the ground. Besides, if a great conflagration should occur in the borough, it might be necessary for the water company to have recourse through its emergency intake to the river to introduce Allegheny River water into the system. Therefore, the prohibition of the discharge of sewage into the streams above the island or into the ground on the island is a reasonable precautionary measure.

All existing municipal sewers empty into either the Allegheny River or the Conewango Creek. Three of them are above the water works emergency intake, one at the mouth of the Conewango Creek, another into the creek, a few hundred feet above its mouth, and a third one into the creek above the dam.

The sewer at the mouth of the creek is brick, thirty by forty-five inches in diameter and is the outlet for the sewer system in East Warren. Possibly four thousand people reside in the district, comprising the Fifth and Sixth wards of the borough. In the summer of one thousand nine hundred and five the public authorities of Warren applied for permission to extend the East Side sewer system up the Conewango Creek. The plans proposed provided for pipes to take storm water as well as sewage, with storm overflows at five different points above the dam in the creek, whereby ordinarily (in dry times) the sewers would take the sewage to the outlet of the system at the mouth of the creek, but during rainfalls of any considerable amount the sewers would not carry all the down-pour and hence the mingled storm water and sewage would back up in the

sewers and overflow to the pipe provided for the purpose into the Conewango Creek, thereby tending to re-establish the pollution of the creek. The Department of Health disapproved this arrangement and the Commissioner required that storm water should be excluded from the sewers, on overflows to be constructed and separate conduits to be provided for sewage and for storm water. These modifications were adopted by the borough. Most of the streets in these wards are now sewered.

The sewer a few hundred feet above the mouth of the creek comes down from wards one and two in West Warren, or the old part of the borough, crosses the island in the extension of East street and empties into the creek below the dam. It is an old sewer, eighteen inches in diameter and serves about two thousand people.

The sewer above the dam is at the foot of Seventh street in West Warren. It is eight inches in diameter and with it are connected a few houses only.

Below the emergency intake of the water company there are thirteen public sewer outlets into the river. All of them are in West Warren with one exception, this being outlet for the sewer system in the seventh ward which comprises all of the territory in South Warren. It is twelve inches in diameter and empties into the river just above the Pennsylvania Railroad bridge. The sewers at present are between the railroad and the river. The territory south of the railroad has been laid out and will be developed in the future and sewers to be built in the new district would gravitate towards the river below the bridge.

During one thousand nine hundred and six extensions to the Seventh ward sewer system were approved by the Commissioner on the condition that storm water be excluded from the sewers and that the outlet into the river shall be a temporary one only, and upon the adoption of a general intercepting sewer for the borough, this outlet shall be abandoned and the sewers be connected with the said intercepting sewer.

Each street in West Warren which extends to the river has a sewer in it which terminates at the river bank. More or less of a nuisance is caused thereby. The nearest sewer to the water companys intake crosses the island and enters the river at the foot of Liberty street four hundred feet below said intake. This sewer is fifteen inches in diameter and was built in one thousand nine hundred and six under the approval of the Commissioner of Health on condition that its use be temporary only pending the adoption of a general intercepting sewer and that the borough shall proceed forthwith to make surveys and prepare plans for a main trunk sewer to intercept all of the sewage outlets into the Conewango Creek and Allegheny River within the municipal limits, and submit the same with a suggested plan of disposal to the Department.

The local authorities now ask for permission to extend the sewer system in the Fifth ward and to discharge the sewage therefrom into existing sewers which have their outlet into the river at the mouth of the Conewango Creek. Said additions will amount to about one and one-half miles. They will take sewage only and will reach a present population of approximately three hundred and eighty people.

The conditions are not materially different but if anything somewhat improved over those existing in one thousand nine hundred and five when the Governor, Attorney General and Commissioner of Health determined it to be for the interests of public health to approve extensions to the sewer system. The conditions of the permit then granted have been complied with, with the exception that plans for an intercepting sewer have not yet been submitted to the Department.

So long as the borough sewers continue to contribute to the menace of the public water supply, and the public authorities and tax-payers neglect to remove these menaces, the efforts of the State authorities to discontinue the discharge of sewage into the streams above Warren are somewhat discounted.

The assessed valuation of Warren approximates four million dollars and its bonded indebtedness is reported to be such that over one hundred thousand dollars may be raised without exceeding the constitutional indebtedness of the municipality.

The cost of intercepting the borough sewage now discharged into the streams above the water works pumping station need not be necessarily expensive and is easily within the borough's financial ability. The Department does not have evidence before it showing why such interception should not at once be accomplished, but to the contrary the evidence at hand makes plain that the interests of the public health in Warren demand such public interception.

Besides the local menace the disposal of Warren sewage into the river constitutes a menace to the municipalities down stream which use the Allegheny as a source of public supply. Siverly, Oil City, Parkers Landing, Kittanning and other towns use the river water wholly or in part for this purpose, and the Warren authorities should in preparing plans for sewerage improvements contemplate the time when its sewage shall be purified before being discharged into the river.

It has been unanimously agreed that the interests of the public health demand that permission be granted and it is hereby and herein granted to the borough of Warren to make the proposed sewer extensions in Ward Five, under the following conditions and stipulations:

FIRST: That all storm water shall be excluded from the system and that plans of the proposed sewers as built shall be filed with the Department.

SECOND: That before the proposed sewer additions are made, plans shall be prepared by the borough and submitted to and approved by the Department of Health, the object of which plans shall be to intercept the flow of the Seventh street sewer and of the East street sewer and of the Fifth and Sixth wards' outlet sewer and all other public or private sewers in the borough discharging into the streams above the water works emergency intake where the sewage may be temporarily discharged pending the consideration of the ultimate treatment of the entire borough's sewage.

THIRD: That the borough construct a cast-iron sewer on the island and after causing the abandonment of every privy on the island require the sewage and household wastes from every building thereon to be discharged into this sewer, which sewer should be tributary to the proposed main intercepting sewer herein provided for.

FOURTH: Temporary permission to discharge sewage into the river from the proposed intercepting sewer shall cease on April first, one thousand nine hundred and nine. If at that time the interests of the public health require it, the time will be extended in which sewage may be discharged from said sewer into the river.

FIFTH: The proper local authorities shall see to it that no pathological material from any laboratory be discharged into the sewer system. These wastes shall be incinerated on the premises.

Harrisburg, Pa., March 23, 1907.

WARREN, WARREN COUNTY.

State Hospital for the Insane.

This request for advice and plans relative to improved sewerage was made by the Board of Trustees of the State Hospital for the Insane at Warren, Warren county, Pennsylvania, and in compliance therewith, preliminary surveys, estimates and investigations were caused to be made and a report thereof submitted to the Governor and Attorney General, who, after due consideration, arrived at the unanimous conclusion that the interests of the public health require that a permit be granted to the Board of Trustees of said hospital for the extension of its sewerage system under certain conditions herein outlined.

It appears that the State Hospital for the Insane at Warren is located on two separate tracts of land, one for the hospital buildings and the other for the farm colony. Both tracts are in Conewango township, Warren county, border on the Conewango Creek and extend back westward by gradual ascents to the foot-hills which are from one-quarter to two-thirds of a mile from the creek, thus continuing to the summits of the hills and beyond for a distance of about one mile. The table-land is rolling, some of it is used for pasturage, some for cultivation and the remainder is wooded.

The buildings are located on sloping ground between the foot-hills and the stream. They front on the State highway facing the creek. Formerly this road was the Warren and Jamestown highway. It runs along the west bank of the Conewango Creek and near it. The tracks of the Dunkirk, Allegheny Valley and Pittsburg Division of the New York Central Railroad and the tracks of the Warren and Jamestown Electric Street Railway pass by the valley near the foot of the hills.

The hospital buildings are located on the larger tract (four hundred and seventy-five acres) which is two and a half miles above Warren borough, the county seat, situated at the confluence of the Conewango Creek and the Allegheny River. Here there are twelve hundred patients and about three hundred employes, housed in the main building, (which is of the typical old architecture, four stories high, administration hall and officers' quarters in the center, with wards on either side), old Hygeia Hall, Eckhart Building and the nurses' annex. Buildings erected during one thousand nine hundred and six, but not yet occupied, are the North Annex, South Annex, new Hygeia Hall and the Infirmary. Besides these, there are the laundry, bath house, power house, gas and water pump houses and minor buildings all located on the sloping ground between the railroads and the State highway. West of the railroads are the stock and sheep barns, pig-pens, henneries and cultivated fields.

The farm colony tract (one hundred and ninety-five acres) is one and a half miles further up the Conewango. Here there are seventy-five patients and about fifteen employes. They are housed in a large three story building and a farm house. These structures and the barns, and so forth, are located west of the highway and railroad tracks.

The present accommodations are outgrown. The number of listed inmates for the last ten years is shown in the following table:

Date. Year.	Number of Patients.
February 28th, 1897,	995
February 28th, 1898,	1,016
February 28th, 1899,	1,037
February 28th, 1900,	1,046
February 28th, 1901,	1,035
February 28th, 1902,	1,029
February 28th, 1903,	1,040
February 28th, 1904,	1,060
February 28th, 1905,	1,037
February 28th, 1906,	1,151
February 28th, 1907,	1,191

Were accommodations afforded, it is reported that the number of inmates would be increased by several hundred. Applications for commitments are continually being rejected. Three new cottages are to be added to the hospital grounds, during the coming two years, to be followed by three more cottages, provided the present plan of development is carried out. What the future growth will be is problematical. Militating against a high maximum population is the growing opinion among authorities that the number of patients in an insane hospital should not exceed the number with which it is possible for the medical superintendent to come in contact and personally know.

The water supply is obtained from driven wells located on the banks of the Conewango Creek, about two hundred and fifty feet therefrom. There are two twelve inch wells sixty-nine feet deep, terminating in a gravel stratum, beneath an impervious roof. The water is drawn from these wells by two compound, duplex, Worthington pumping engines, each one million gallons capacity, and forced through three thousand feet of eight inch main into the two circular brick-lined reservoirs located on the hill-side one hundred and forty-five feet above the main hospital building. The reservoirs have a total capacity of one million two hundred and sixty thousand gallons. From them the water is supplied by gravity to the hospital and farm colony. A two inch line of pipe extends to the latter.

The daily consumption for all purposes, allowing for pump slippage, averages five hundred thousand gallons in summer, a per capita consumption of three hundred and twelve gallons. This is excessive. The average daily consumption during January and February of one thousand nine hundred and seven was three hundred and eighty thousand gallons. This is also excessive. The difference between summer and winter consumption is accounted for, perhaps, by the fact that in summer three public fountains and lawn sprinkling make material demands on the supply.

When the North and South Annexes, the new Hygeia, the Infirmary cottages, and the three new cottages to be constructed in one thousand nine hundred and seven, are furnished, they will be occupied by inmates to be taken from the main hospital, thereby making room for new commitments.

The farm colony may be enlarged, the purchase of more tillable land being contemplated. It is reported that the consumption at the main hospital will remain about constant, regardless of its number of occupants, and that in consequence when the present additions and the contemplated ones are made to the cottage plan, there will be a material increase in the water consumption. It is estimated that the daily average will amount to eight hundred thousand gallons.

The sewers take sewage and storm water. There are two sewer outlets from the hospital grounds.

One outlet is a twelve inch pipe, serves the Hygeia Halls and empties into the creek about one thousand feet above the water works pump house and about twenty-five hundred feet above the dam across the Conewango. The dam was built to divert water to a mill-race. It is about eight feet high and back-floods the creek for three-quarters of a mile. In this stretch opposite the institution there are three islands owned by the State, upon which shelter houses are maintained for the accommodation of the institution inmates. Occasionally picnics are held on the islands. Slack water affords opportunities for rowing. Boats are provided by the hospital authorities. Swimming is not prohibited and consequently is occasionally indulged in by employes and others, so it is reported. All these things transpire below the Hygeia sewer outlet.

The other sewer outlet at the hospital grounds empties into the creek three thousand feet below the dam. The outlet is on private property. The sewer is a brick conduit twenty-four by thirty-six inches in diameter, and is a main to a system branching out to all of the buildings both sides of the railroad, comprising, all told, over two miles of sewers.

Besides sewage, roof water and surface drainage from walks, drives and extensive agricultural tillage, the sewers receive the overflow of the reservoirs.

The volume discharged from the outlet is very considerable and the Conewango Creek in summer time is in a filthy condition, emitting strong odors, all the way down to the borough of Warren. The nuisance has become so noticeable within the borough limits and directly at the mill-race, where sewage from the State Hospital is known to accumulate and deposit, that it was made the subject of bitter complaint at a well attended public meeting held in Warren the middle of January, one thousand nine hundred and seven. It appears that the borough's water supply is drawn from wells which are about two hundred feet distant from the mill-race, and that the epidemic of gastro-enteritis of December seventh to twelfth, one thousand nine hundred and six, during which over eighteen hundred people were severely afflicted, was caused by sewage pollution of the water supply. While no connection between the race water and the wells has been proven, nevertheless, it is not prudent, in the interests of public health, to permit the pollution of the race water, and public security in the said water supply will not be restored until possible menaces shall have been removed, the most prominent of which is that caused by the discharge of hospital sewage into Conewango Creek.

There is a sewer outlet into the creek at the farm colony. It is an eight inch pipe. The sewage from the two pipe outlets into the creek above the dam has not caused a nuisance so far as odors are concerned. The appearance of the water there is not noticeably one of sewage pollution, except in the immediate vicinity of the outlets. However, while the pollution of the creek by the institution sewage is of local importance to the people of Warren, yet the pollution is of more widespread public concern. Public sentiment in the State respecting pure water took the form of improved legislation in one thousand nine hundred and five, vesting power in the Commissioner of Health to preserve the purity of the waters of the State for the protection of the public health. Where streams are used as sources of drinking water, it has been found necessary to exercise jurisdiction and to remove sources of pollution located at remote distances above the water works intakes, because under certain conditions, the sewage may be transported by the streams and in a few hours from the time of its admittance be introduced into the water pipe systems, to become an actual cause of sickness and death to the people drinking that water. In order, therefore, to successfully safeguard the public health it is essential that sewage should be kept out of such streams, and it seems fitting that the State institutions should be the first to set the example to others, and since sewage from the Warren State Hospital is emptied into the Conewango Creek, whose waters, mingled with that of the Allegheny River, are used as sources of supply during emergencies at Siverly and Oil City, and constantly at Parkers Landing, Kittanning and other places below, including Pittsburg, the interests of the public health demand that such sewage should be taken out and first purified before the liquid is permitted to go into the creek.

The Conewango Creek rises in New York State, Lake Chautauqua being the source of its western branch, the eastern branch rising in Cattaraugus county, and drains five hundred and fifty square miles in New York State and one hundred and fifty square miles in Pennsylvania, above the Warren State Hospital. The population in New York State living on this watershed is approximately sixty-six thousand distributed in one city of thirty thousand, and the remainder in rural districts and small villages. The population in Pennsylvania does not exceed five thousand, distributed in one borough of five hundred and eleven, and six townships. Thus it appears that the sources of pollution of the creek, excluding the Warren Hospital, are practically within the State of New York. The report from the State Health Commissioner of New York has not yet been received by the Department relative to the disposal of sewage in the Conewango drainage area. However, the State Departments of Health of these neighboring commonwealth are working in unison to preserve the purity of the streams.

Owing to the prohibitive cost of purification works designed to treat the output of the present combined sewers, it will be necessary to effect a separation of the sewage from the storm water, and so forth, before the sewage can be treated. The dry weather flow may be intercepted and the storm water permitted to overflow into the stream during storms, but this would not obviate the pollution of the creek at such times. Since such pollution would be a menace to those relying on the water for drinking purposes in the municipalities below, it is proposed to construct a new system of sewers at the hospital, whose object shall be to collect sewage only from all of the buildings and convey it to a sewage purification plant. The plan contemplates that the present sewers, whose sizes were designed with special reference to their capacity to carry off rainfalls, shall be maintained in the future for this service only.

It will be necessary to make alterations in the existing storm sewers and in the house connections which now admit of roof water as well as sewage.

Levels have been taken and it is known to be possible to collect, at one point in front of the main hospital building, by gravity, the sewage of all of the hospital buildings. It will require one and a half miles of sanitary sewers to accomplish this result, and also one-half mile of new storm drain. The sewers will range in diameter from eight inches to twenty-four inches, and with their appurtenances, including changes in plumbing fixtures, house connections, grease traps and ventilators, involve an estimated expense of twenty thousand dollars.

At the point of convergence of the proposed sewer system is to be built a masonry septic tank roofed over and covered by sods, from which, by an inverted syphon, the sewage is to be conducted to an artificial island in the creek belonging to the institution, where sprinkling filters, followed by rapid sand filtration, are to be used.

As a preliminary estimate it is not safe to estimate a plant of less capacity than eight hundred thousand gallons daily. However, an extended and critical examination of the causes of the present abnormal consumption of water at the institution will probably result in practical measures for the material cutting down of the amount of water necessary to be introduced into the sewer system.

Between the mill-race and the creek there is an island, one hundred and fifty feet wide and several thousand feet long, of which about eight hundred feet of the upper end are on the State property. This island is twelve feet above the bed of the stream, eight feet above low water and about five feet about the present stage of the creek. It has been flooded to a depth of about one foot, so that its use for sewage disposal works requires that protective embankments shall be constructed. The water in the race is three feet below the surface of the island. The details of the proposed purification plant have not been worked out, but surveys show that it will be possible to conduct the sewage from all buildings on the hospital grounds to the works by gravity. The preliminary estimate of cost of the septic tanks, inverted syphon, filters and protective embankments for a plant capable of treating eight hundred thousand gallons daily is thirty thousand dollars.

In view of the foregoing considerations, it has been determined that the interests of the public health demand that the sewage of the Warren State Hospital for the Insane shall, therefore, be taken out of the Conewango Creek and purified, and that for this purpose a sanitary system of sewers be built there to collect the sewage from all the buildings on the hospital grounds and to convey it to a disposal plant to be located at such a point on the said grounds as may be reached by gravity.

It has also been determined that it be recommended to the Board of Trustees that an appropriation of fifty thousand dollars be obtained for improved sewerage, drainage and sewage disposal works, as much of this sum as required to be expended by said Board of Trustees in the construction by contract of detailed plans to be prepared under the direction and supervision of the State Department of Health, which shall exercise direction and supervision of the construction thereof and also of the operation and maintenance thereafter; which recommendations are herein made.

Furthermore, it has been determined that the Board of Trustees be notified that before any changes, improvements or additions to the existing sewer system can be made, it will be necessary for plans thereof to be submitted to and approved by the Department of Health, and that such approval will carry with it conditions and stipulations relative to the operation and maintenance of said works.

Harrisburg, Pa., March 23rd, 1907.

WASHINGTON, WASHINGTON COUNTY.

This application was made by the borough of Washington, Washington county, Pennsylvania, and is for permission to extend its sewer system and to discharge the sewage therefrom, treated, into Chartiers Creek within the limits of South Strabane township.

In the summer of nineteen hundred and five the matter of the pollution of Chartiers Creek by Washington borough sewage was made the subject of a petition and complaint to the Commissioner of Health on the part of certain abutting land owners along the stream. Upon request by the Commissioner, the local authorities of Washington took up the consideration of means to remove the cause of complaint. In pursuance of the matter, experts were employed and plans evolved, which plans were subsequently submitted by the borough on September tenth, nineteen hundred and six. These plans received tentative approval, pending modifications of details called for in adapting the project to local conditions.

Washington borough, the county seat of Washington county, is located in the valley of Chartiers Creek near its head waters and distant about twenty-five miles above the point where the stream enters the Ohio River. This point is at the western extremity of the city of Pittsburg, on the south side.

Besides being the county seat and a trading place for surrounding farming territory and a manufacturing town, it is in the natural gas and oil and bituminous coal fields. Therefore, the expectation of a continued substantial growth is warranted. The census population of Washington in nineteen hundred was seven thousand six hundred and seventy. Since nineteen hundred, North and South Washington boroughs and a part of Canton township have been annexed. The normal increase having been rapid also, the present population is estimated to be twenty thousand. The proposition to annex West Washington borough was favorably decided at the last November election, and the necessary formalities for consolidation may have been concluded by this time, in which event greater Washington may have a population of twenty-four thousand or more.

East Washington, estimated population between two thousand and three thousand, still remains a separate municipality. Its territory is partly surrounded by that of the main borough. There is no visible line indicating where one begins or the other ends, and the interests of both places relative to public necessities and convenience are identical.

With substantial correctness, it may be said that greater Washington is bounded on the west by Chartiers Creek and that a tributary called Catfish Run, flowing westerly, divides the entire community into a north and south part. It is in the northern district that the buildings are principally located. The eastern portion comprises East Washington. The western part of the southern district constitutes West Washington. All three are on hills, having abundant slopes and an excellent drainage.

The court house, stores, hotels and office buildings are on an eminence and along Main street north of the run. At the foot of this street and at the run and near East Washington is the passenger station of the Chartiers Valley Railroad, a branch beginning here and operated by the Pennsylvania Railroad Company. It extends down the valley to Pittsburg. The local industries are located along this line. The main tracks of the Baltimore and Ohio Railroad pass through the town at a higher elevation and cross the other tracks by an overhead bridge.

There are two natural water courses in East Washington which extend under the high Baltimore and Ohio Railroad embankment and thence for a short distance through Washington borough to Catfish Run. The channels are partly open and partly closed. The Hanna street, or easterly, run rises in East Washington borough. The other, or westerly, run rises in Ward Six of Washington.

Along Catfish Run are various small industrial plants. Also three breweries and a slaughter house. They are drained to the sewer.

On Chartiers Creek in West Washington district are glass and iron works and tin mill plants. At the forks of Catfish Run and Chartiers Creek, the latter has a pronounced yellow color characteristic of industrial pollution. This appearance is foreign to the run. Below on the banks of the creek in the township are the mills of the McLure Tin Works, the Tyler Tube Works and Pipe Plant, a Paint and Varnish Company and the works of the Beaver Refining Company. Indications of increasing acid and other industrial pollutions may be observed along this stretch of the stream.

There is a slaughtering and rendering establishment, bearing the name of the Home Dressed Beef Company, located on the banks of the creek near the McClure Tin Mill. Part of the drainage therefrom goes to the sewer and part goes directly to the creek.

The public water supply, which is very generally used in the district, is furnished by the Citizen's Water Company. The average daily consumption is said to be one million gallons.

Public sewers were first installed in Washington about eighteen hundred and eighty-eight, after general plans prepared by Waring. West Washington is without sewerage, but East Washington has separate sewers and a sewage disposal plant.

The Washington sewers comprise about eighteen miles, of which twelve miles are six inch pipes, two miles are eight inch pipe and four miles, the main sewer, is a pipe line whose diameter ranges from twelve to twenty inches. The system is extended all over the thickly built up portion of the town. The grades assure self-cleansing velocities, ventilation is effected through manholes and through untrapped soil pipes of the houses, flushing is automatic and frequent inspections are made.

The hillside sewers are comparatively tight, but on the flats, both in the main sewer and the laterals, there are leaks. The flow in the main sewer increases three-fold during wet periods. This would not occur if the sewer joints were tight and if no roof water were admitted to the system. During rains, the main sewer becomes surcharged and sewage is forced out through tops of certain manholes, proving the sewer to be too small for the works now put upon it.

It is reported that at least three thousand eight hundred buildings are connected to the sewer system, being equivalent to a contributing population of fifteen thousand people. The remaining population use back-yard privies.

The main sewer begins at the foot of Main street and follows the general course of the Pennsylvania Railroad one and a half miles to the Fair Grounds. Here it formerly discharged into Chartiers Creek. In nineteen hundred and three, the sewer was continued down stream by a pipe eighteen inches in diameter at the beginning and twenty inches in diameter at the end, to a point two miles below the Fair Grounds. The grade is said to be one foot in one thousand.

Here, on a farm of over a hundred acres near Arden station on the Pennsylvania Railroad, in South Strabane township, the borough built a settling tank two hundred feet long, twenty feet wide, eight feet deep and divided into three compartments by cross-walls. At the outlet end a bed of broken stone, fifteen feet wide and one hundred feet long and about four feet deep, was provided, through which it was intended that the settled sewage should flow continuously. At the time of the Department's inspection, this strainer was clogged and the sewage was flowing over the top of the stones into the creek unchanged in quality. As it flowed into the stream the sewage was black, very offensive in odor and highly putrescent, as evidenced by the nuisance created in the creek below.

In very dry weather, the creek flow here is not over three or four cubic feet per second, an amount totally inadequate to successfully dilute Washington sewage from the standpoint of nuisance prevention. It has been determined that the average flow of low water is twelve cubic feet per second; and that when the flow is seven cubic feet per second, in spite of the mixing of the sewage with the acid wastes in the creek, a very bad condition of pollution exists at the settling tank.

The average dry weather flow of sewage is one million gallons per twenty-four hours, the day rate is twice the night rate, and the maximum rate is three million gallons, as determined by weir measurements.

The borough experts report that the sewage of Washington on test shows an average of eight hundred parts per million of fats for the night flow, and two thousand parts for the day flow, which results prove said sewage to be abnormally high in fats and suspended matter, particularly at night.

This accounted for partly by the presence of slaughter house refuse, pieces of fleshings, hair, blood, etc.

The applicants represent that formerly the borough sewage was discharged into Chartiers Creek untreated, but that suits for damages forced the authorities to construct an intercepting sewer and sewage disposal works in South Strabane township, which works have been outgrown, rendering it necessary that a new plant for present and future purposes shall be built.

It is proposed to continue the use of the old tank in the new plant. The level of the liquid in said tank is from six to seven feet above low water in the stream. By constructing shallow three foot filters, it would be possible to treat a certain portion of the present flow in the outfall sewer, on land just below the tank on the same side of the creek. This shallow depth of filter would place the effluent outlet at a sufficient elevation to effect a free discharge into the creek when the stage was less than four feet above low water level. Whenever the stream was above this stage, the tank effluent would pass directly to the creek. This is not contemplated now and should never be done.

The old tank is to be slightly altered, outside at the entrance thereof on the end of the twenty inch sewer main is to be built a screen chamber, and the first compartment of the tank is to be used as an inlet chamber to a proposed syphon under the creek, extending to a pump well about three hundred feet distant, whence the sewage is to be lifted into septic tanks to be built nearby. Sprinkling filters, sedimentation basins and sludge disposal areas are also provided, all to be located on the thirty acre tract of land opposite the old tank and lying between the creek and the tracks of the Washington and Cannonsburg Street Railway Company. The other two compartments of the old tank are to be made into one compartment and be provided with a twenty inch outlet pipe whose invert is to be the same elevation as the invert of the inlet sewer at the screen chamber.

Whenever the pumps cease to operate or fail to take the flow of the sewer, the discharge of the raw sewage into the creek will take place through this emergency outlet at the old tank. Details of this part of the tank and of the syphon and the pump well and superstructure have not been submitted.

The pumping machinery is to comprise two gas engines and two five inch and two eight inch centrifugal pumps. The pump well is to be low enough to receive drainage from all other structures. One eight inch pump is to be used for raising mixtures of water and settling basin sludge to the sludge drying area. It is to have a capacity of two thousand gallons per minute against a head of fifteen feet. Each five inch pump is to have a capacity of seven hundred nd fifty gallons per minute when operating against a head of twenty-three feet. The rated capacity of each gas engine is twenty horse power. Thus it will be seen that ample capacity is provided and in duplicate, to obviate, in connection with proper attendance, any sewage overflow through the emergency outlet at the old tank into the creek.

The force main, which may be three hundred feet long, is to be cast iron and fourteen inches in diameter, and it is to terminate at the septic tank. The low water line in the tank is to be elevation nine hundred and ninety-three and the high water mark three feet higher. The average vertical lift from the pump well to the septic tank will be about twenty feet.

The tank is to be a concrete structure, made watertight and covered over and being about one hundred feet square. It is to be divided into four equal parts, each one hundred feet long by twenty-five feet wide, interior dimensions. The depth of sewage will be between eight and eleven feet. So each compartment will have a capacity of from one hundred and fifty thousand to two hundred thousand gallons, which is equivalent. all told, on an eight hour storage basis, to a rate of flow of between one and eight-tenths and two and four-tenths million gallons daily.

To each compartment the sewage is to be admitted through twelve inch pipe inlets, two in number, spaced six and one-quarter feet from the sides of the compartment and with the center line two feet below low water level. Four feet from the end of the tank, and extending across the entire width thereof, is to be a baffle, or deflector. Mid length of the compartment is to be a submerged baffle extending from the bottom six and one-half feet high, and thus being one and one-half feet below low water mark. The object of this partition is to promote subsidence in the first bay and facilitate are removal of deposits whenever this is required. The longitudinal dividing wall between Compartments One and Two, and the longitudinal dividing wall between Compartments Three and Four, contains an eighteen inch drain pipe near its bottom, and below the floor of each compartment and in the center of each bay, sloping towards this dividing wall and the pipe therein, is a channel or sluice-way, at the foot of which and at the wall there is a pipe opening into a manhole chamber, one opening with valve attachment to each sluice-way. These manholes are carried up by reinforced concrete construction to the top of the tank, so that there is no way for the liquid in the compartment to reach the eighteen inch drain other than by the prescribed way; with the exception, however, that at the top of each manhole there is an overflow opening, eighteen inches long and six inches deep.

The two eighteen inch drains pass out beneath the rear end of the tank to an area of about one and one-half acres on the bank of the creek. This land is to be graded and utilized for the disposition of sludge. The drainage from the septic tank will reach this area by gravity. The concrete slab at the sludge outlet is to be placed at an elevation of nine hundred and eighty-four, which is three feet higher than the invert of the main town sewer where it terminates at the screen chamber. Detail plans of this area, with a description of the precise manner of handling the sludge, have not been submitted. Presumably, the sludge is to be dried out on this area.

In Compartments Three and Four, at the outlet end, is to be provided an eighteen inch vitrified pipe, center line on a level with the low water level, by means of which, through a small connecting chamber about three feet square extending down from the top of the tank to the shelf carrying the eighteen inch pipe, communication between these two compartments may be readily effected. A stop plank in the chamber will provide the means for opening or closing connection between these two compartments.

The four compartments may be used in parallel, or, if a high velocity of flow be desired, three of them may be used in tandem. When sludge accumulates to an extent making drainage necessary in any particular compartment, such compartment may be flushed out through either one or both of its blow-off manholes. The septic tank effluent is to pass out through twelve inch openings, three to each compartment, set level with their inverts at the low water line and terminating in a collecting conduit extending across the entire width of the outlet end of the entire tank. Each twelve inch pipe into this conduit is fitted with a shear gate. Grooves in the sides of the conduit are also provided for stop planks. It terminates at the dosing or control chamber.

While the average daily flow of sewage is about one million gallons, it varies from a one and five-tenths million gallon rate to a six-tenths million gallon rate, and at times of rain the flow to the plant will be about three million gallons for short periods. On account of this fluctuation, it is essential to regulate and effect a more even distribution on the filters. When the rate falls below one million gallons, the head on the sprinkling nozzles at the filter will diminish and improperly distribute the sewage. Hence, when this condition occurs, the entire flow is to be automatically shut off until sufficient head has accumulated for proper distribution, when the flow to the filters will be automatically resumed. As shown, the design permits an extreme variation of three feet in head. With a rate of flow of six hundred thousand gallons per day and with one tank in use, the period of cessation will be forty minutes; with two tanks in use, one hour and twenty minutes and with three tanks, two hours.

In order to guard against freezing, there is to be placed in the cast iron risers in each filter a one inch hole two feet below the surface, so that the sewage cannot stand in the nozzles long enough to freeze.

Another means of preventing freezing may be to reduce the area of filter used, by capping the vertical risers, to an extent which will assure a constant flow of sewers on to this particular area. Facilities for manipulations of this kind are afforded in the design.

The cross walls in the tank compartment make it possible for one-half of a compartment to be cleansed at a time. Hence the dose of sewage and sludge is made relatively small, and if the upper layers of the sewage were drained to the pump well, and only the concentrated sewage and sludge were drained to the sludge area, the volume would be materially reduced and the process of drying our rendered comparatively inoffensive.

The filters are to be placed in a structure having concrete bottom and sides and in plan being about three hundred feet long and two hundred feet wide.

In the centre is to be the central gate chamber. Here through a twenty inch pipe, the septic effluent is to be conveyed and directed at will into any one or all of the four filters by means of fifteen inch pipes. The said chamber is provided to facilitate operation of the gates. No sewage is to be discharged into it. There are to be four filtering units, each one hundred and fifty feet long by one hundred feet wide, grouped about the central gate chamber. Lengthwise from it in either direction is to extend a gallery, which gallery will divide the filtering area into two equal parts, and paralleling this gallery on either side of it and one hundred feet distant are to be side galleries each having a total length of three hundred feet. The latter galleries are to be four feet wide in the clear. The former is a double passage way, having a longitudinal partition wall, making each half gallery four feet wide in the clear. The inner walls of each gallery serve as the side of a filter and these passage ways, which extend down to the concrete filter floor level, are provided to facilitate inspection and cleaning of the under-drainage system.

These two filters, one hundred feet wide and three hundred feet long, lying between the inspection galleries, are each divided into halves by a lateral wall, paralleling the ends and extending from the sides to the central gate chamber. In the foundation of this wall at a sufficient depth is to be laid the twenty inch drain, which is to remove the filtrate from each one of the four filters to the next apparatus in the process of the proposed treatment, namely, the subsidence basin.

In this wall and above is also to be laid the twenty inch influent pipe leading to the gate chamber.

The floors of each filter are to be sloped one in sixty towards the centre, where the main collector is to be built in the concrete below the floor and to be covered over by concrete slabs with spaces left between. This collector is to start at the end wall of each filter and pass down longitudinally through the centre of each unit to the twenty inch drain pipe in the middle lateral wall. The entrance to this drain is to be effected in an effluent gate chamber, where valves are to be placed on the inlets to the drain. The lateral collectors are to consist of five inch, semi-circular tile pipe, bell joints, laid on the floor of the filter from the edge of the main collector to the sides of the filter, in parallel rows, ten and one-half inches on centres. These pipes are slotted on the bottom to give more entrance area.

On top of this underdrainage system is to be placed a layer of broken limestone, ranging in thickness from ten to twenty inches, depending upon the slope of the floor of the filter. This bottom layer is to consist of stone which has passed through a four inch screen and been retained on a two and one-half inch mesh. On top is to be a layer of broken limestone five and seven-tenths feet in thickness, the surface of which is to be elevation nine hundred and eighty-nine, which is four feet below the low water in the septic tank. This top layer is to consist of stone rejected by a one inch mesh, but passed through a two inch mesh. The rock is to be quarried on the premises and is of hard texture.

The sprinkling nozzles are to be placed at the surface of the filter and to be screwed into the top of cast iron risers three inches in diameter. These vertical pipes are to connect to horizontal pipes five inches in diameter embedded in concrete walls called distributor walls. They are parallel and ten and ten and three-quarters feet apart on centres. They are about three feet below the surface of the filtering material. In these walls at twelve and one-half foot intervals the cast iron risers are inserted.

The filtration lay-out has a rated capacity of two million gallons. It is expected by the designers that the filtrate will be non-putrescible, that it will contain dissolved oxygen and be suitable to discharge into Chartiers Creek without causing objectionable conditions.

The eighteen inch drain is to determine in an outfall chamber. In the galleries on the sides are supported four inch water pipe connected up to two and a half inch hose valves, placed conveniently to admit of flushing out the underdrain system or for cleaning the filtering material. At the outfall chamber to the filter stop planks and a swinging gate are provided to deliver the sewage to either half of the sedimentation basin. This structure is to be

concrete bottom and sides, rectangular in plan and open. The bottom is to be about fifty feet square, and the walls around the top will make an enclosure about seventy-two feet square. There is to be a partition wall across the middle dividing the basin into two equal parts. In the centre of this wall and basin is to be erected a manhole outlet provided with a ten inch pipe drain leading to the pump well. The oxidized suspended matter removed in these basins from the filtrate is to be drained through the ten inch pipe to the pump well and thence be forced to land on the opposite bank of the creek below the old tank. The petitioners expect that these deposits will be inoffensive.

The filtrate will pass to either half of the basin through a twenty inch drain having six inch inlets to the basin, the centes of which are to be one foot above the bottom of the basin. The flow line is to be at elevation of nine hundred and seventy-nine and five-tenths, which is also the crest of the weir. This provides a depth of flow of about five and a half feet. The highest water in the creek was one foot above the bottom of the filter floor or three feet above the crest of the weir. This occurred once only and when there was an obstruction in the creek. The weir is above all but extreme freshets, so that sedimentation will be practically continuous throughout the year. About two hours retention is provided when both compartments are in use.

Thus it appears that thirteen vertical feet are utilized in the process proposed between the low water line in the septic tank and the weir crest of the settling basin.

In Chartiers Creek valley there are several boroughs, two large public institutions and considerable pasture land abutting the stream below Washington. There are also coal mines in operation and these increased in number as the Ohio River is approached, so that the stream becomes an acid one and is unfit for domestic uses on this account. However, it does not follow that the upper waters of the stream do not need to be protected from pollution. Of all places in the State, it is in the coal regions, where the lower streams of the basins are unfit for domestic uses, that the upland waters are a peculiarly valuable resource and need to be conserved. Any sewerage system, therefore, like the one at Washington, should provide for not only the removal of those matters in sewage which produce a nuisance in the stream, but the pathogenic poison as well. The proposed plan is well conceived and designed in accordance with the best practice in the treatment of domestic sewage. But in order to ensure best results and a high average utility, it is necessary that the abnormal flow of sewage due to the admittance of roof water and leakage, and the abnormally high fatty matter due to the admittance of slaughter house refuse, should be regulated.

The pollution of the creek at the Home Dressed Beef Company's plant should cease. The admittance of the slaughter house refuse to the sewers, should, however, be regulated under provision of Clause E, Section 4, of the borough ordinance of November fifteenth, eighteen hundred and ninety-seven, which clause provides that, whenever it is necessary, suitable catch basins shall be constructed according to plans to be made by the engineer, and to be built on private property, etc., and in further compliance with Section 7 of said ordinance, prohibiting the discharge of certain materials injurious or prejudicial to the functions of the public sewer system.

Clause B, of Section 4 of the ordinance prescribes that roof water shall not be admitted to the sewer without special permit by the borough engineer, but that all such connections conveying rain water to the sewer shall be disconnected whenever the burgess and council may deem it necessary so to do. This power may be vigorously exercised to advantage. If the roof water were cut out of the system the outfall sewer would be ample in capacity to carry the town sewage for a long time.

Otherwise, a new outfall sewer, or the repairing of the old one is a necessity. A relief high level sewer has been suggested. It would discharge the sewage to the works by gravity. The flow from the low level would continue to be pumped, and it is problematical how much flow the low level would deliver to the pump well. If the leaks were not repaired, possibly during extreme wet times the sewer might be full. The problem of how to cut down the flow to a normal amount needs to be immediately studied, and the first move in this direction should be to exclude roof water from the sewers.

The easterly run in East Washington receives the sewage from a sewage disposal plant located in the valley at the Baltimore and Ohio Railroad embankment. This is the borough boundary. The effluent, or more properly sewage, flowing from the disposal works is conducted by a pipe part way through the culvert under the said railroad embankment, where the sewage is discharged. The lower end of the culvert empties into an open ditch, length about one hundred feet, from which point the run is again enclosed is a masonry conduit. This open ditch is in Washington borough. The Fifth Ward school house occupies the lot on one side and a private residence occupies the lot on the other side. On the day of the Department's inspection in December, the ditch was an open cesspool, creating strong odors and no doubt an annoyance and

nuisance to property owners and people living in the neighborhood. In the summertime the stench arising from this pollution of the run is manifest for many hundred feet in the borough of Washington, and has been made the subject of complaint by public and private individuals.

The disposal works were built in nineteen hundred and three and comprise a septic tank and three filters, all covered over, because the neighborhood is built up and the design was to obscure and hide the presence of the sewage disposal plant from view from the dwellings in the immediate vicinity.

The septic tank and the three filters are built side by side. The tank is thirty-three feet long and six feet wide, interior dimensions, and six and a half feet deep at flow line. The sewage first enters a grit chamber and then passes through a screen into a second grit chamber, or inlet compartment, to the tank. At the other end of the tank there is an outlet chamber from which the settled sewage is piped back to the front end of the tank to a dosing chamber eight feet wide and twelve feet long, erected opposite the three filters. In this chamber are placed three eight inch syphons connecting each to its particular filter. An automatic apparatus effects the discharge of these syphons in rotation, as often as the dosing chamber becomes filled. Each filter is thirty-six feet long and eight feet wide and contains four feet of filtering material. Two of the filters comprise broken stone and the third has a top layer of sand. The effluent passes to a collecting channel which terminates in a chamber from whence the outlet pipe leads under the railroad culvert.

The territory within the borough which contributes by gravity to the disposal works is about ninety acres in extent, and here there are now built and in operation an eight inch sewer main about three thousand feet long and connecting with it six inch laterals totalling two and three-tenths miles.

In the easterly run the district within East Washington borough is served by a district main eight inches in diameter, about twenty-three hundred feet long and terminating in a pump well in an alley south of Beau street, from whence the sewage is raised over the hill into the easterly sewerage district. Connecting with the pumping district main are six inch laterals totalling one and one-tenth miles. It is reported that there are ninety connections on the western system and eighty-five on the eastern system, making a total of one hundred and seventy-five buildings connected with the system out of a total of two hundred buildings in the municipality on the line of existing sewers.

The present flow of sewage is said to be fifty thousand gallons daily. The existing plant is totally inadequate to treat this volume of sewage. The borough of East Washington has a valuation of nearly one and a half million dollars and an outstanding indebtedness in the neighborhood of twenty-five thousand dollars, so it is reported, which, if true, gives the municipality a borrowing capacity in the neighborhood of seventy-five thousand dollars. There is no valid excuse, therefore, for the continuance of the pollution of the run by the borough sewage.

There are two ways suggested as remedies. The borough may enlarge and improve the sewage disposal works and assume the expense of proper operation and maintenance of the plant thereafter, or the borough may abandon the disposal works, substituting therefor an outlet sewer into the Washington borough sewer about three hundred feet distant. The latter expedient is the rational method to pursue. It would be more efficient, less expensive, and also a permanent improvement. If the disposal works be enlarged, in all probability, the money would be invested in a plant fated to be a neighborhood annoyance and bound to be ultimately done away with. If the sewer outlet be built, another advantage will accrue, namely, that the pumping station could be abandoned and the expense obviated by the connection of the western main sewer with the Washington borough sewer in that run. The Ward Six district of Washington, previously mentioned as being in this run valley, has sewers laid in it without an outlet. The right of way through East Washington for a sewer line is contested by the latter municipality. Negotiations are now pending for a settlement of both sewer outlet questions. Meantime, public health demands that the nuisance in the easterly run shall be abated.

It has been unanimously agreed that the interests of the public health demands that permission be given to the borough of Washington to extend its sewer system and that approval be given to the proposed sewage disposal works which permission and approval are hereby granted under the following conditions and stipulations:

FIRST: That on or before December thirty-first, nineteen hundred and eight, a plan of the borough sewerage system, showing the location, sizes and grades of existing sewers, shall be prepared and filed in the office of the Commissioner of Health, and thereafter lateral street extensions may be made to the system, and at the close of each season's work satisfactory plans thereof shall be filed in said Commissioner's office, together with any other information in connection wherewith which may be required.

SECOND: All storm and roof water shall be excluded from the system. During the year nineteen hundred and eight, the local authorities shall study

the problem of eliminating leakage into the sewer system and shall submit a plan therefor to the Commissioner of Health for approval on or before January first, nineteen hundred and nine.

THIRD: The borough council shall enforce the ordinance relative to compulsory connection with the sewer system in the case of the slaughter houses and other places now discharging sewage into any of the waters of the State, and shall cause to be built upon each individual property proper receptacles for the interception of all matters whatsoever prejudicial to the functions of the public sewerage system and disposal works. In the case of the slaughter houses, these provisions shall be enforced within three months of the date of this permit.

FOURTH: Detail plans of the alterations at the old settling tank of the syphon, pump well, force mains and sludge drying areas, together with a brief description of the proposed method of operating these areas, shall be prepared and be filed with the Commissioner of Health. The borough shall make such changes, if any, in the plans of the sludge drying areas, as in the opinion of the Commissioner of Health may be necessary to prevent sewage passing therefrom directly or indirectly into Chartiers Creek.

FIFTH: The screen and syphon chamber and connected tank and overflow to the creek shall be so operated and maintained as to prevent the flow of sewage into the creek except in extraordinary emergency. Whenever this flow is used, the date shall be noted and the Commissioner of Health notified.

SIXTH: Vertical pipes or openings in the roof of the septic tank shall be provided to prevent the accumulation of explosive gases.

SEVENTH: The borough authorities shall place some one in responsible charge of the disposal plant and there shall be continuous attendance at the plant, day time and night time. Daily reports of the operations at the works shall be kept on forms to be approved by the Commissioner of Health, and if at any time it appears that the disposal works or the sewerage system, has become outgrown or unsuitable, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise.

EIGHTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

The attention of the borough is called more especially to that part of the discussion herein, relative to joint sewer outlets for the east and west districts in East Washington borough. The authorities of East Washington will be notified that it must cease to discharge unpurified sewage from its sewage disposal plant into the waters of the State and that plans for a remedy should be submitted to the Department of Health for approval within ninety days from the date of this permit.

Harrisburg, Pa., December 31st, 1907.

WILLIAMSPORT, LYCOMING COUNTY.

This application was made by the city of Williamsport and is for permission to extend its sewer system and to discharge its sewage therefrom into the West Branch of the Susquehanna River.

It appears that the city of Williamsport is the seat of Lycoming county, has an estimated population of about thirty-five thousand, which, by the census of the year one thousand nine hundred, was twenty-eight thousand seven hundred and fifty-seven, and is located on the north side of the West Branch of the Susquehanna River on a flat plateau of alluvial deposit elevated about twenty-five feet above the low stage of the river. In the year one thousand eight hundred and eighty-nine, the entire flat was submerged during the river freshet.

The incorporation territory extends along the river for about five miles and back therefrom for a distance from one to one and a half miles. Coming down from the north and joining the river about midway of the city's frontage on the river is Lycoming Creek, which rises in the mountains in the north part of the county, and in its length of thirty miles drains a very rugged, well wooded and sparsely populated water shed. East of this creek, within the city, are located eleven of the thirteen wards, most of the population and all of the business section. West of the creek in Williamsport is a settlement known as Newberry.

Opposite the city on the south bank of the river are located the boroughs of South Williamsport and Duboistown, populations three thousand four hundred and six hundred and fifty respectively. The city is bounded on the north by old Lycoming township, which is west of Lycoming Creek, and Loyalsock township, which is east of Lycoming Creek. In the latter township are the villages of Vallamont, Grampian Heights and Lloyd's Addition contiguous to the city line and a part of the community to all practical intents and purposes.

Undoubtedly these places will be annexed to the city territory in the future. They are located on rising ground whose drainage is to the river through the city of Williamsport. Immediately north of them are high mountains.

The Williamsport Water Company operates the public water works system which supplies the city and its suburbs comprising all told about forty thousand people. The total consumption is about five and one-half million gallons daily. In Williamsport east of Locust street and in South Williamsport the supply is furnished by the Williamsport Water Company system as it existed prior to the consolidation of this company with the Citizen's Water and Gas Company. The latter corporation was chartered in June one thousand eight hundred and seventy-nine, and the former in April, one thousand eight hundred and fifty-three.

The Citizen's Water and Gas Company supplies all of the city west of Locust street and Duboistown borough. Its source is Mosquito Run, a small mountain stream flowing into the river from the south opposite Lycoming Creek. It is a typical mountain stream, drains a sparsely populated area, and it is reported that all of the water shed is owned by the water company. In this valley, at an elevation sufficiently high to supply the town by gravity, there is located a reservoir which impounds twenty-one million gallons of water.

The supply for the Williamsport Water Company is taken from Hageman Run, a small mountain stream rising in Bald Eagle Mountains immediately back of South Williamsport. There is a six and a half million gallon storage reservoir located on this stream, whose elevation when full is one hundred and eighty-five feet above city datum. The water shed of this stream is also owned by the water company, so it is reported. Both supplies are sufficient for the city's needs except during dry times. Then recourse is had to ground water which is obtained from seven wells sunk twenty-seven feet deep in gravel formation on the banks of the river at the mouth of Lycoming Creek. The water from this source is pumped into the system. The citizens of Williamsport pride themselves on the quality of the water supply. It is reported to be one of the municipal assets. The public officials point with pride to the low death rate of the city.

The system of sewerage of the city is constructed on a separate plan. There are three outlets, and they are into the river.

The Chestnut street sewer outlet is fifteen inches in diameter, serves the extreme eastern part of the city, and will, when extended, include Lloyd's Addition and a part of Grampian Heights, and discharges into the river at the eastern city line about one thousand feet below the Philadelphia and Erie Railroad bridge across the river. The district it serves is almost wholly residential.

The Basin street sewer outlet is two and sixty-six-hundredths by four feet in diameter, serves the business section of the city and all territory west of Lycoming Creek, including the suburbs north of the city line, and discharges into the river at the foot of Basin street at a point about fifteen hundred feet below the Market street bridge over the river, and about three-quarters of a mile below the dam across the river.

The Arch street sewer outlet is twenty-four inches in diameter, serves the Newberry districts west of Lycoming Creek and discharges into the river about one-half mile above the mouth of Lycoming Creek.

There are about eight miles of storm water drains in the city. One of the main drains is four feet in diameter and empties into Grafius Run at Franklin street in the central part of the city. The most important drain is eleven feet in diameter, intercepts the upper tributaries of Grafius Run which drain Vallamont and empties into the river just below the dam.

Grafius Run at one time was a sewer outlet for numerous sewers, but several years ago the large intercepting drain was constructed in Locust street to the river so that at the present time this run receives a small amount of storm water only, and it is reported that sewer outlets into it have been abandoned.

The petitioners report that the sewer system now being constructed was installed by the city in the year one thousand eight hundred and ninety-one, according to a comprehensive system designed at that time, and that of the population of the municipality of thirty-five thousand people, approximately twenty-nine thousand are included in the sewer districts, and that seventy-five per cent., or about twenty-two thousand people, use the existing sewers. There are about one thousand cess-pools in use in the city, and about four thousand privies are in use, many of which privies are on properties having sewer connections. The city desires to be given permission to continue to extend the sewer system from time to time as necessity may require, in such portions of the city as are contemplated in the original design where sewers are not yet constructed.

The city also asks permission to extend its sewers into Vallamont District in contemplation of the ultimate annexation of this territory to the city.

The natural drainage of Vallamont is into Grafius Run, and private sewers are now discharged therein, the flow being intercepted by the Locust street intercepter. The district lies in a small basin bounded on the north by high

hills, is being developed by the Vallamont Land Company for a first class suburban residence section, sewers are demanded, there is no opportunity for the erection of a sewage disposal plant there owing to the pre-emption of all of the land for building purposes, the existing private sewers cause a nuisance in the run and all interests concerned have united on the project of installing a sewer system and connecting it with the sewers in Williamsport. At present there are a number of cess-pools in the district, and it is reported that lack of sewers is proving a hinderance to the development of the settlement.

During the last few years Williamsport has witnessed an industrial boom, due to the enterprise of its citizens, as well as to the city's natural advantages. Silk mills, garment factories, dye works, mercantile establishments and the railroads are flourishing, and additional industries are promised. Civic pride runs high and in consequence large expenditures have been incurred for public improvements. The assessed valuation of the town is slightly above nine million dollars, which in connection with the present bonded indebtedness limits the city to an expenditure of less than one hundred thousand dollars as determined by statute, therefore, it appears that the municipality has not funds available for the extension of lateral sewers, and for the erection of sewage disposal works. However, it would be well if the local authorities should contemplate the time when it will be possible for the city to discontinue the discharge of sewage into the river, and to prepare for the time by the study of the problem of how best to accomplish the interception of all of the sewage of the city and its conveyance to some point for treatment.

It would also be well for the city in permitting connections with sewers in the districts outside of its corporated territory, to stipulate that when it shall become necessary for the city to purify its sewage, a pro rata assessment shall be levied and paid by the users of the sewers in such outlying districts.

It has been determined that the interests of the public health demand that a permit be granted and permission is hereby and herein granted to the city of Williamsport to extend its sewer system in the unsewered sections of that part of the city contemplated in the comprehensive system originally designed but not yet sewered by sewers and for the extension of the city sewer system into the outlying districts of Vallamont, Grampian Heights and Lloyd's Addition, under the following conditions and stipulations:

FIRST: That all sewers extensions shall be built on a separate system and receive sewage only.

SECOND: That at the close of each season's work plans and profiles of the sewers built during the year shall be prepared and filed with the State Department of Health, together with such other information in connection therewith as may be required by the Commissioner of Health.

THIRD: If for any reason the sewer system or any part thereof shall become a nuisance or menace to public health beyond the jurisdiction of the local authorities, then such remedial measures shall be put in force as the Commissioner of Health may suggest or approve.

FOURTH: No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

FIFTH: On or before May first, one thousand nine hundred and ten, the city shall prepare a plan for the interception of the flow from all of the sewer outlets of the city, and for the conveyance of the sewage to some point or points for treatment, and submit said plan to the State Department of Health for approval. This permit for the discharge of sewage from the city sewers into the waters of the State shall cease on the first day of May one thousand nine hundred and ten, but if on said date the interests of the public health or other conditions demand it, then the Commissioner of Health will extend the time provided the conditions of this permit shall have been complied with.

Harrisburg, Pa., June 10th, 1907.

WILLIAMSPORT, LYCOMING COUNTY.

This application is made by the city of Williamsport and is for permission to construct a sewer outlet into the Susquehanna River within the limits of the city, and to build a sewer system connecting therewith to serve the western part of the city.

It appears that Williamsport city is located on the north side of the West Branch of the Susquehanna River on flats which are elevated about twenty-five feet above the low stage of the river. The incorporated territory extends along the river about five miles and back therefrom for a distance of from one to one and a half miles. Lycoming Creek which rises in the mountains to the north, passes about midway of the city southerly to the river. The principal part of the city is located east of this creek. All of the bridges across the river and the dam therein are also east or down stream from this creek. There is a settlement called Newberry west of Lycoming Creek. Beyond this for a mile or more, lies the undeveloped section of the city. It is a tract rectangular in

area and in which, paralleling the river, and over half a mile therefrom are the tracks of the New York and Hudson River Railroad and the tracks of the Philadelphia and Erie Railway. Between the railroad and the river are the flats. Through them flows Dougherty's Run.

Within the city limits, about half a mile from the westerly boundary thereof, three separate industrial concerns are about to erect works. They are the Central Pennsylvania Lumber Company's Car and Machine Shops in connection with the Susquehanna and New York Railroad, the Elk Tanning Company's Sole Cutting Plant and the Keystone Glue Company's Works. These companies are reported to be subsidiary or closely allied to the United States Leather Company. The railroad shops will employ about one hundred men, the sole cutting plant about five hundred, and the glue works between one hundred and fifty and two hundred men.

It is anticipated that after the erection of these plants, the workmen will live in the neighborhood and thus give an impetus to the building up of this section of Williamsport.

The water supply for the district is to be obtained from the ground and test wells are being sunk for this purpose along the railroad.

The city purposes to build a sewer which will serve the immediate needs of the new industries and to provide for the building up of the western part of the town.

The city sewer system is built on the separate plan in conformity with a design which was adopted in eighteen hundred and ninety-one, contemplating the sewerage for all of the occupied portions of the municipality. The extreme western district now under consideration therefore, was not included. There are three outlets all into the river. Two of them are below the dam and Lycoming Creek. The third is known as the Arch street sewer. It is twenty-four inches in diameter and serves the Newberry district west of Lycoming Creek and discharges into the river one-half a mile above the mouth of the creek.

The city's water supply is furnished by private water companies, the sources being mountain streams, which are sufficient for ordinary needs, but during dry times recourse is had to ground water which is obtained from wells sunk in gravel formation on the banks of the river at the mouth of Lycoming Creek. This supply is said to be pure, but judging from experience elsewhere, its purity would be seriously jeopardized were the river permitted to become grossly polluted.

The proposed sewer is to have its outlet into the river at the foot of Nicely's Lane, which is at a point about two miles above the Arch street sewer outlet. It is to be twenty inches in diameter, and to pass under Dougherty's Run by an inverted syphon, details of which have not been submitted.

While the structure is to be paid for by the Central Pennsylvania Lumber Company, it is to be built under the supervision of and according to plans to be prepared by the city, and when the sewer is completed, it is to become the property of the city and the city is to have the right to collect all charges for connections with the sewer. The company reserves to itself perpetual right to use the sewer free of all cost and expense.

This reservation includes the right to use the sewer by the three industrial plants above mentioned.

The output from the Keystone Glue Company's Works will be a waste peculiar to plants of this kind, requiring special treatment before the liquids should be permitted to enter into a common sewer such as the proposed sewer is to become.

The raw material used at the glue works will consist of flushings and hide pieces from tanneries. It is expected that about thirty million pounds of this material will be consumed yearly. The stock will come from the tanneries treated with lime as a preservative, so it will be necessary in preparing the stock for glue manufacture to remove the lime and for this purpose stock washing machines such as are generally in use in all glue manufactories will be installed. The liquid wastes from this washing process will constitute the principal sewage output from the plant which it is estimated will be in the neighborhood of five hundred thousand gallons daily. It is proposed to conduct all of the liquid wastes from the plant to precipitating tanks for the purpose of recovering any material of value therein. In addition, the company purposes to install further treatment works for the clarification of the sewage similar to that approved by the State Department of Health and now in use by the Pennsylvania Glue Company at Springdale, Pennsylvania. The company has still further stated in writing that it will be glad to adopt any further plan or suggestion made by the State Department relative to the treatment of the sewage. It is represented that the enterprise is an important addition to Williamsport industries but that before contracts are let for construction, it is necessary for the city to assure the company that the sewer will be provided and that a permit therefor be granted by the State.

It further appears that the liquid output from the other plants in the district will not be different from ordinary sewage.

It has been unanimously agreed that the interests of the public health demand that a permit be granted and permission is hereby and herein granted to the city of Williamsport to build the proposed sewer outlet in the western section of the city and to discharge sewage therefrom into the Susquehanna River under the following conditions and stipulations:

FIRST: That the sewer and its connections shall be used for the conveyance of sewage only and that if temporary permission be given for the discharge of roof and storm drainage into the sewer, it shall be with the reservation that when necessary or upon requirement by the State, all roof and storm water drainage shall be excluded from the system.

SECOND: That before the proposed sewer and its connections are built, detail plans and profiles of the same with special reference to the syphon shall be prepared and submitted to the Department of Health for approval.

THIRD: This permit is granted under the further stipulation that the Keystone Glue Company before using said sewer shall prepare detail plans for disposal works for its plant which shall be submitted to the State Department of Health for approval and as modified or amended shall be constructed, and the city shall enter into an agreement with the said glue company to this effect.

FOURTH: On or before November first, nineteen hundred and seven, the city shall prepare a plan for separate sewerage of the district tributary to the proposed sewer outlet and submit the same for approval to the State Department of Health in order that there may be a definite plan of sewerage adopted for the district which may be extended from time to time as necessity for the case may require.

FIFTH: No pathological material from any laboratory shall be discharged into the sewer. The proper authorities shall cause these wastes to be incinerated on the premises.

SIXTH: On or before May first, nineteen hundred and ten, the city shall prepare a plan for the interception of the flow from all of the sewer outlets of the city and for the conveyance of the sewage to some point or points for treatment, and submit the said plan to the State Department of Health for approval. This permit for the discharge of sewage into the waters of the State shall cease on the first day of May, nineteen hundred and ten, but if, on said date, the interests of the public health or other conditions demand it, then the Commissioner of Health will extend the time provided the other conditions of this permit shall have been complied with.

SEVENTH: If for any reason the sewer or any connection thereof should become a nuisance or detrimental to the public health, then such remedial measures shall be adopted as the Commissioner of Health shall advise or approve.

Harrisburg, Pa., June 10th, 1907.

WYOMING, LUZERNE COUNTY.

This application was made by the borough of Wyoming, Luzerne county, and is for approval of the outlined system of sewerage as proposed by the said borough.

It appears that Wyoming is in the center of the northern anthracite coal fields.

It is bounded on the north by West Wyoming borough, on the east by Exeter borough, on the south by the North Branch of the Susquehanna River, and on the west by Kingston township.

The area so incorporated contains about nine hundred acres, and is rectangular in shape, being about three-quarters of a mile wide back from the river, and about one and three-quarters miles long on the river.

Approximately one-fourth of the area is built up, and out of a total borough population of about twenty-five hundred people, twenty-one hundred people live in this built up part which is the eastern section of the town.

North of the river there is a mountain range paralleling the river and extending from the west through Kingston township, West Wyoming and Exeter boroughs and at the bottom of these mountains there are low lands and swamps which would extend all the way to the river were it not for an intervening ridge or low elevation and flat, and about a half a mile wide. It is on this low plain that the village of Exeter borough and Wyoming borough are situated. Through this low plateau the main thoroughfare of Wyoming borough, named Wyoming avenue, extends longitudinally, paralleling the river.

Coming down from the mountains in Exeter and West Wyoming boroughs are runs which unite and form Abraham Creek which enters Wyoming borough near the north-east corner thereof and thence flows westerly in the borough near the Delaware and Lackawanna Railroad, which forms the boundary line between Wyoming and West Wyoming boroughs, finally empties into the Susquehanna River in the borough of Forty Fort about a mile and a quarter below Wyoming. This stream receives some sewage. Its waters are black like ink and acid most of the time, owing to waste matter discharged therein from mining operations.

When the Susquehanna River is in extraordinary high stage about two-thirds of the entire borough area is flooded including the low lands in Abraham Creek valley. The low lands which are subjected to annual inundation are elevated between twenty and forty feet above low river water. They comprise over half of the borough territory. The central portion of the land available for permanent occupancy averages about sixty feet above low river water. It is less than half a square mile in extent and drains naturally either to the north to Abraham Creek or south across the flats to the river. It is on this plateau of gravel and sand formation that Wyoming village is located.

Privies and loose-wall cess-pools are the principal receptacles of sewage. There are approximately one hundred cess-pools and six hundred privies in the borough. The ground in the vicinity of many of the cess-pools is reported to be saturated with sewage and unable to absorb all of the liquid wastes disposed of in the soil. Owing to the flatness of the plateau and the street grades, storm water does not flow off readily, and frequently cellars become partially flooded. There is a public demand for storm water removal from the highways as well as the removal of sewage from the dwellings and other buildings.

The water supply is furnished by the Spring Brook Water Supply Company, which operates the Wyoming Water Company plant. The water is brought in from the Moosic Mountains some twelve miles distant. Perhaps two hundred people use the water obtained from about fifteen wells which are scattered over the borough. These wells are driven to a depth of from sixty to one hundred feet in sand and gravel to a bed of clay. The water from these wells is generally considered unsafe for domestic use. The public supply is soft and excellent for industrial purposes. The source is thought to be uncontaminated by sewage.

The working people in Wyoming are largely employed in one of the coal mines of the Temple Coal and Iron Company, which mine is situated in Exeter borough just east of the Wyoming borough line. Also the Eagan Machine Company, Hutchins Sewer Pipe Company and the Wyoming Shovel Works, these being located within or near the boundaries of the borough.

Wyoming is a place of residence for some of the well-to-do business men of the city of Wilkes-Barre which is on the opposite side of the river and about four miles west of Wyoming. It is the purpose of the citizens to make the village a most desirable locality to live in and adequate sewerage and drainage facilities are among the needed public improvements.

There are six private sewers emptying into Abraham Creek from as many residences. These sewers are six inches in diameter and were constructed without a permit or resolution of the borough council. The houses are north of Wyoming avenue and in them reside about thirty-five people. The Pennsylvania State Constabulary barracks also has a six inch pipe into said creek, which pipe serves about thirty people. Probably the fact that no nuisance has been created to cause a complaint may be attributed to the acidity of the creek water, due to the discharge of mine drainage into it.

The borough has an eighteen inch storm drain which removes surface water only from Wyoming avenue near Seventh and Eighth streets to Abrahams Creek.

In one thousand eight hundred and ninety-five the borough granted permission to J. A. Hutchins and Company to lay a pipe sewer from Sharp avenue southerly between Sixth and Seventh streets under Susquehanna avenue, and across the flats to the river. The pipe is eighteen inches in diameter and carries away house sewage and some roof water. About fifty houses are connected with it. This structure is now the property of John A. Hutchins estate.

The sewerage system proposed is for all of the territory likely to be built upon, lying above the flood line of the river, and is to remove both sewage and storm water and to discharge it into the river. A detail plan of the system has not yet been prepared by the borough because the public authorities thereof wish if possible to first obtain the approval of the State Commissioner of Health to such a general system of sewerage and sewage disposal. However, a rough sketch has been drawn up and submitted with the application.

The Hutchins sewer is to be purchased by the borough and made to serve a district tributary to it of about fifty acres in which three hundred and fifty people now reside, which may be increased to a thousand in the future. The sizes proposed will range from eight to eighteen inches in diameter, and the district calls for the construction of one and one-half miles of new sewers. The main sewerage district of the borough comprises two hundred acres in which now resides about two thousand one hundred and fifty people, which population may be doubled in the future. The sizes proposed will range from eight to fifty inches in diameter and the total length of all sewers will be seven miles. The outlet of this system is to be into the river at a point about three thousand feet down stream from the Hutchins sewer.

Extreme flat grades are proposed ranging from two-tenths to four-tenths per cent.

The following municipalities take their water supply from the Susquehanna River below the point where Wyoming would put in sewage if permitted to do so:

Municipality.	Miles below Wyoming.
Berwick, industrial uses,	32
Danville, filtered,	66
Sunbury, filtered,	68
Marysville, domestic uses,	115
Harrisburg, filtered,	122
Wormleysburg, domestic uses,	122
Steelton, domestic uses,	124
Columbia, filtered,	154

In the Scranton district, to more properly speaking the valley of the Lackawanna River, which joins the Susquehanna River about three miles above Wyoming, there is a combined population of over two hundred thousand people, of which over one hundred and seventy-five thousand are known to be discharging their sewage into the river at points very largely within a radius of twenty-five miles of Wyoming.

In the Wilkes-Barre district and extending to the West Branch of the Susquehanna River there are ten municipalities known to be discharging sewage into the North Branch below Wyoming, comprising a population of over one hundred thousand people.

So it appears that above and below Wyoming, or adjacent to the same river into which Wyoming would discharge its sewage, there is a total population of over two hundred and seventy-five thousand known to directly sewer to the river. This fact renders the use of the Susquehanna River water for drinking purposes dangerous unless the water be first adequately filtered. Mitigating against the danger is the fact that there are one hundred and seventy-three collieries whose combined daily output of waste mine water goes into the river and during ordinary stages of the river and especially in dry periods renders the river strongly acid or sufficiently so to cause a precipitation of suspended matters to a considerable extent. Probably when the Susquehanna River near Wyoming is strongly acid from coal mine drainage there is much less risk of pathogenic poison or bacteria being carried many miles down stream. However, during floods when the river stage is sufficiently high to render the water alkaline, it is entirely probable that pathogenic material is carried down stream. During floods sewage from the Scranton and Wilkes-Barre districts might arrive at Harrisburg in twenty-four hours.

This menace is so great as to demand a policy of prevention and no new sewerage system should be designed without contemplating sewage purification works. While Wyoming's sewage would not measurably increase the existing river pollution, yet it would be contrary to the policy of the State Department of Health to grant approval of plans that did not provide for the purification of the sewage of the municipality at the earliest practical time.

The assessed valuation of Wyoming is approximately three hundred thousand dollars which fixes the statutory limit of indebtedness at twenty-one thousand dollars of which two thousand dollars have already been contracted, leaving for public improvements the sum of nineteen thousand dollars. A plan of sewer assessment is under discussion whereby one dollar per linear foot is to be levied on the abutting estates. The remaining cost of the sewerage system, whatever it may be, to be defrayed by general taxation. Under this plan, possibly thirty thousand dollars would be contributed by assessments. Add the sum the borough can expend to this amount and a total in round numbers of fifty thousand dollars for the entire system is obtained.

The proposed combined sewer system might be constructed for eighty thousand dollars, but probably the cost would not be less than ninety thousand dollars. Fifty thousand dollars would be totally inadequate to provide general sewerage and drainage facilities. Therefore, only a part of the sewer system could be built within the funds available, and this part would comprise at the outset the building of the large expensive sewers, leaving the smaller amount for the construction of pipes in the streets where they are needed. A very much higher linear assessment would be necessary to provide storm drains immediately if they are to be laid in all of the streets in the borough, or very generally.

Still further, the admittance of storm water to the sewers complicates the problem of sewage treatment and involves a much greater expense when the sewage is treated. In fact the difference in cost between sewage disposal works capable of handling the small volume of sewage proper and works capable of handling the very large volume of combined storm water and sewage would be a sum larger than the amount of money necessary to build independent sewer and drain systems.

It is estimated that a sanitary sewer system adequate for present and future needs of the borough can be built at this time for fifty thousand dollars, and possibly it might be installed for forty thousand dollars, provided permission could be obtained to discharge the sewage into the river. The fact that there is no land available in the borough for a sewage disposal plant except it be on the flats, and that the cost of conveying the sewage to such a plant and constructing the works so as to adequately protect them against freshets and ice gorges would be necessarily high, practically precludes the treatment of the borough's sewage under its present limitation of indebtedness. But with sewers provided in the borough, its growth and prosperity in the near future would bring them financial ability to complete the sewerage improvement.

By a careful study of the assessment problem it may be possible for the borough authorities to provide surface drainage at low points in the streets where it is most needed and to construct a separate system of sewers for the entire borough.

It has been determined that the interests of the public health demand that approval be withheld and approval is hereby and herein withheld to the outlined system combined sewerage as proposed by the borough of Wyoming.

It has also been determined that the borough authorities be advised that plans should be prepared for a separate system of sewers and sewage purification works which the Department may modify, amend or approve, when submitted to it in due form for approval, and may fix a time—consistent with the date when other municipalities now polluting the Susquehanna River in the vicinity of Wyoming shall be required to do the same—within which the sewage purification works shall be built and that meantime under stipulated conditions, the borough may be formally permitted to empty its sewage into the river; which things are hereby and herein advised.

It is entirely possible that the best method of handling the sewage of West Pittston, Exeter, Wyoming, Forty Fort, Kingston, Luzerne, Dorranceton, Edwardsville and Plymouth might be the construction of a joint sewer along the river front leading to one common sewage disposal plant to which would also be delivered the sewage of the city of Wilkes-Barre. Such a project is ultimately probable judged from the merits of the local case and the history of sanitary problems of adjoining municipalities somewhat similarly situated. Therefore, it might be well for the borough sewer system to be laid out as to deliver its sewage either into a trunk sewer along the river front or sewage disposal works within the borough territory.

It has also been determined that the borough authorities be afforded a hearing on the general subject of sewage and it is hereby and herein suggested that said borough authorities name a date convenient to them for such a hearing should the same be desired.

Harrisburg, Pa., March 8th, 1907.

YORK, YORK COUNTY.

This application was made by the city of York, York county, and is for the approval of plans for the proposed sewerage and sewage disposal works, and for the construction thereof.

It appears that a permit for the extension of the city sewer system was issued by the Commissioner of Health on January eighteen, one thousand nine hundred and six, under certain conditions, among which were the following:

"That all of the sewage of the city shall be collected by the new city sewer system and a plan thereof shall be prepared and filed with the Commissioner of Health on or before March 1st, 1906, showing the entire district ultimately to be served by said system and having marked therein the sewers of said system built on or before January 1st, 1906. At the close of each succeeding year, a plan shall be submitted to the Commissioner of Health showing the sewers added to said system during the year just past.

"That all storm and roof water shall be excluded from the said system of sewers. Therefore, existing storm sewers must not be taken into said sewer system.

"That the sewage from the said sewer system shall be conveyed to some suitable place and there be treated by some well known and acceptable process. Plans of the intercepting outfall and sewage disposal works must be submitted to the Commissioner of Health for his approval before the same works are built."

It also appears that in compliance with the provisions of the said permit of January eighteenth, one thousand nine hundred and six, the city of York has prepared the plans for proposed sewers and sewage disposal works and submitted them for approval.

The city of York has a present population of about forty-five thousand people, and in its suburbs outside of the city limits there are estimated to be ten thousand people, making a total of fifty-five thousand, supplied by the York Water Company. This same district will ultimately be served by the proposed

sewer system, which is designed to accommodate a total population of one hundred and twenty-five thousand. The city is the county-seat and a prominent manufacturing community. Its chief industries are the manufacture of silk, wall and roofing paper, boilers, ice machinery and farming implements. The first two contribute large volumes of liquid waste to the stream.

At the present time there are twenty-three sewer outlets into the Codorus Creek within the limits of the city. This creek rises in the southwest corner of the county, drains an area of about two hundred and thirty square miles above the city, upon which reside a population of about twenty-six thousand people, located in eight boroughs and thirteen townships, passes through and drains the city of York and continues in a generally north-easterly direction below the city, a distance of nine miles to the Susquehanna River which it enters at a point about eight miles above Columbia on said river. The normal dry weather sewage output of the twenty-three outlets is about one million seven hundred thousand gallons daily, of which about one million gallons must come from the silk and wall-paper mills. These wastes discolor the water of the creek. About ten miles above the city, on a branch of the Codorus, there is a large paper mill, whose liquid wastes pollute the creek so that the creek is not pure when it enters York.

There is a succession of dams on the creek, so that its flow is sluggish in and immediately below the city. Dam number one is located where the creek enters the city. Dam number two is located just below the city limits and dam number six, the last dam is located on the Rapids. From this point to the river, a distance of about three miles, the fall is approximately sixty feet, and the course of the stream is through a deep, narrow, precipitous, rocky gorge. Slack water from dam number two extends back through the city to dam number one, so that all of the said twenty-three sewer outlets are into slack water. Therefore, dam number two creates a pool or elongated sedimentation basin, and in turn, each successive dam acts in a similar manner to retard the velocity and promote deposit of suspended matter.

To obviate the trouble within its own limits incident to such disposal of sewage, and to extend sewerage facilities throughout the municipality, experienced and reliable engineers were employed, a system of sewerage was designed and adopted for which an appropriation of four hundred thousand dollars had been previously made, and the work of construction was carried forward until the money became exhausted. It was early apparent that the four hundred thousand dollars appropriation would be insufficient to complete the system of street sewers, although the original loan had been authorized by the public with the expectation that four hundred thousand dollars would be enough to defray the expenses of both sewerage and sewage disposal works.

About ninety per cent. of the interior system of street and house lateral sewers, as designed by the engineers, has been completed on lines comparing closely with the distributing pipes of the water and gas supplies as developed to the present time. There yet remains to be built some important street sewers and all of the outfall sewer and the disposal works. It appears that these additions will cost four hundred thousand dollars.

The Commissioner of Health refused permission to the city to put the new sewer system, as now built, into commission, pending the securing of funds for the construction of the outfall sewer and disposal works for the reasons fully set forth in a decree issued January eighteenth, one thousand nine hundred and six.

It appears that the Codorus Creek at times of low summer flow, for periods of several weeks at a time, may not yield at York city a volume sufficient to dilute the sewage of more than from ten to fifteen thousand people without creating a nuisance.

At present, excluding the mills, seven thousand people only are using the old sewers. If the new system of sewers were used and discharged into the creek, probably twenty-five thousand people would contribute to the flow during the first twelve months, and such new use would create a material increase in the pollution of the creek. Not only would the owners of property abutting the stream in the city suffer thereby, but the proprietors in the townships below would be damaged. These lower riparian owners, or some of them, are represented by counsel and are prepared to protect their rights in the waters of the creek before the State Health Department and the civil courts, if necessary, It nowhere appears that the interests of the public health demand that more sewage shall be discharged into Codorus Creek than was being discharged at the time the city of York determined it to be necessary to stop the pollution of the creek by the construction of sewerage and sewage disposal works.

The old sewer system, comprised of the twenty-three sewer outlets and serving seven thousand people, numbers all told a length of about fifteen and nine-tenths miles, of which nine and three-tenths miles are private sewers. Thirteen of the twenty-three outlets into the Codorus Creek were built by private enterprise. Distributed in the city there are fifteen private sewers, or systems which empty into the public sewers, whose outlets are into the creek. These private sewers supply a very large percentage of the total domestic sewage

output to the creek, and unless such sewers are incorporated into the new sewer system, or their outlets into the Codorus are discontinued, the present pollution of the stream will exist after the city shall have completed the proposed system of sewers and sewage disposal works.

The remaining ten of the said twenty-three outlets into the Codorus Creek are city combined sewers, of which six were designed to receive storm water only, but into which a total of one and seven-tenths miles of private sewers discharge. The remaining four public outlets were designed as combined sewers, have a total length of one and a half miles and also serve as outlets for about three miles of private sewers.

There are various other storm drains emptying into the creek or into smaller water courses in the eastern part of the city. It is claimed that they receive no sewage.

It appears that there are now about forty miles of new sewers built within the past three years in conformity with the comprehensive plan of sewerage for the entire municipality, which sewers are not yet in use. It also appears that there are about three miles of sewers, both public and private, built previously to the year one thousand nine hundred and four, which it is proposed to incorporate into the city system, to avoid the expense of duplicate sewers and the expense to adjoining householders of changing connections from existing sewers to new ones. It is proposed to build ten miles of new sewers to complete the comprehensive system and to serve the requirements of the city at present and in the near future. By this plan all existing sewers will either be incorporated into the new system or duplicate sewers will be provided, so that abutting estates will be afforded sewerage facilities. Hence the necessity for the existence of private sewer outlets into any natural water courses in the city will be obviated.

The new sewer system is designed to receive sewage only. Storm and roof water is to be generally excluded, so that none of the existing city combined sewers are to be incorporated in the new sewer system with three exceptions, namely, the Duke street sewer, the East Mason alley sewer and the West Market sewer. Their total length is about two miles and the daily dry weather flow of sewage therefrom is now about half a million gallons. It is proposed that all of the dry weather flow of sewage from these three storm drains shall go into the intercepting sewer and thence to the disposal works, but during storms the mingled sewage and storm water is to be cut out of said intercepting sewer by an approved automatic regulator and caused to overflow into Codorus Creek. This expedient is resorted to principally for the reason that it will save the cost of paralleling the present sewers by new structures and the cost of new house connections. The petitioners represent that it is important that economy as well as efficiency shall be attained by the improvement, and that the discharge for intervals of an hour or so during heavy storms of the small amount of sewage from these overflows will not measurably increase the pollution of the creek resulting inevitably from the wash of the yards and streets of the city into the stream which latter pollution is recognized by the courts to be unpreventable.

The sewers are designed to be self cleansing. Flush tanks are to be provided at all dead ends, ventilation is to be effected through perforated manhole covers and by means of untrapped house connections, by means of which a current of air is to be maintained through the main soil pipe to above the roof of each building. However, a plumbing ordinance to this effect has not yet been prepared so far as the Department is informed. It is also intended that there shall be an official appointed to issue permits for all sewer connections and an official to exercise general supervision over the maintenance of the sewers. In the low part of the town special air vents are to be provided to secure ventilation.

The disposal works are to consist of an outfall sewer, pumping station, septic tank, sprinkling filters and settling basin. The sewage of the city is to be collected at a point on the west bank of the creek in Manchester township near the limits of the city, where the two main sewers of the system are to combine to form the outfall. All of the sewers in the district, west of Cordorus Creek, are to contribute to a forty-two inch sewer main, and some of the sewers in the southern section of the town, east of the creek. The flow from the latter is to be syphoned under the creek near Boundary avenue and added to the flow of the western district. All of the remaining sewers in the district east of the creek, which comprises the principal part of York, are to be connected by a syphon under the creek in the northern part of the city to a thirty-nine inch sewer main, which with the forty-two inch main, combines to form the outfall. The upper syphon is to comprise two lines of sixteen inch iron pipe, and the lower syphon two line of twenty-four inch iron pipe.

The outfall sewer is to be five feet in diameter, to follow along the west bank of the Cordorus, a distance of about five thousand feet to Louck's Mill, terminating at the pumping station. Its slope is to be one in two thousand and its

capacity thirty-three million gallons daily when flowing full. This gravity conduit will provide for future requirements when outlying areas have become populated and annexed to the city.

The pumping plant is to comprise a station three stories in height, in the basement of which is to be located the screening chamber and pump well, and on the first floor of which is to be located three centrifugal pumps, each of a capacity of five million gallons daily, which makes ample provision for the quantity of sewage which may be expected during the first years of operation, the arrangements being such as to accommodate, in the future, four ten million gallon pumps. These centrifugal pumps are to be driven by electric motors to be located on the upper or ground floor of the station, which floor is above high water in the valley. The motors are to be operated by electric currents which it is proposed to obtain from the York Haven Power Company. By means of floats, placed in the pump pit, the pumps are to be automatically controlled. The storage capacity of the five foot outfall sewer is such that the pumps may be stopped for several hours without the necessity of discharge of the sewage into the stream. However, as is customary in all well designed plants, there is provision in the event of some extraordinary accident, for the by-passing of the sewage from the pump well to the creek.

By means of the pumps, the sewage is to be lifted on an average of sixteen feet through ten thousand feet of thirty inch reinforced concrete force main (provided at low points with proper blow-offs and at summits with approved air vents carried up above the line of the hydraulic gradient), to the septic tank, at the disposal works to be located on the west bank of the Codorus Creek immediately below Small's Mill, or dam number four. This dam is located about one and a half miles above dam number six. The intervening land, and in fact all of the land in the valley below the city, is in use for agricultural and farming purposes. Provided, experience shall demonstrate that suspended matters should be more thoroughly removed from the sewage than can be effected by the bar screens at the pump well, then it is the intention to install further screening apparatus at the septic tanks before the sewage is delivered into said tank.

The septic tank is to be a concrete structure, open on top, eleven feet nine inches deep from the flow line and one hundred and seventy feet long by one hundred and thirty-two feet wide in the clear, divided into two compartments, each sixty-six feet wide. By this arrangement there are to be in reality two tanks in duplicate so arranged as to admit of additional tanks in the future. Across the inlet end of each tank there is to be a channel on the outside to conduct the sewage into either one of the septic tanks or both of them. Sluice gates are provided for this purpose. By means of longitudinal concrete partitions extending from the bottom to the top of each tank, each tank is to be divided into three longitudinal compartments. The sewage is to be admitted into the end of one of these compartments, which is twenty-two feet wide, just below the flow line and will pass underneath a top baffle board extending down into the sewage about five feet, and thence down the length of the tank, where it may be directed by means of wooden swing gates back through a parallel compartment twenty-two feet wide, and thence around the end of a division wall down the outlet compartment, twenty-two feet wide, to the overflow weirs, or at will, by means of other swing gates, directly to said outlet weirs on the end of the third or outlet compartment from the first compartment. By this arrangement either one of three compartments in each tank may be used as the necessity of the volume and character of the sewage may require. The capacity of each tank is about one million gallons. It is anticipated that before the works will need enlargement, the sewage contributed will amount to six million gallons daily, or a period of eight hours' retention in the septic tank.

Sludge conduits are provided in the bottom of each tank to deliver the sludge to a drain leading to an area outside comprising about seven acres, upon which the sludge may be disposed of in trenches where the liquid is to be absorbed in the ground and the sludge is to air dry, from whence it is to be subsequently removed and disposed of in a satisfactory manner. The sludge from the settling tanks is also to be handled in a similar manner on the same area.

From the septic tank the clarified effluent is to be conducted into a dosing chamber and thence to the sprinkling filters. There are to be two of these filters, ranged side by side, each three hundred and fifty-four feet long by one hundred and forty-six feet wide, interior dimensions, of concrete receptacles made water tight to contain the filtering material which is to consist of broken limestone whose diameters are to range from one and a half inches to three inches laid six feet in depth upon a false bottom of half round tile six inches in diameter, spaced nine inches center to center, resting on the concrete floor, sloping from the central main distributing gallery dividing the filters seventy-five-hundredths feet to the outer side of each filter where in the bottom below the floor of the filter into which the underdrain system discharges is to be an effluent collector discharging into an outside conduit connecting with the settling basin.

The septic effluent is to be distributed onto the surface of the filters in form of a spray, effected by means of sprinkling nozzles to be placed at the top of vertical pipes connecting with horizontal distributors branching from the main distributor in the operating gallery. The horizontal pipes will be fitted with angle valves so that any particular distributor in the filter may be put out of commission if desirable. By this novel arrangement, the operation of each filter will be flexible and subject to complete control. The dosing tank between the septic tank and the filters will cause the flow of sewage to be intermittent. The pressure at the sprinkling nozzles will range from five to two feet.

The films of suspended matter which will form around the broken stone, dry out and crack and peel off and pass from the filtering material to the floor of the filter below and thence out with the effluent, will impart an unattractive appearance to the discharge; such detached matters, however, are readily removed by sedimentation and for this purpose a basin, having a capacity of sixty-five by one hundred and twenty and four feet deep to the flow line, built of concrete bottom and sides, is provided. The liquid leaving this settling tank should, if the plant be efficiently operated, be satisfactory in appearance and free from organic matter of an objectionable character. The effluent should be non-putrescible.

The elevation of the surface of the settling basin is to be three hundred and forty-one and one-quarter; the filter beds, three hundred and fifty and the septic tank three hundred and fifty-seven. The elevation of the average spring flood in the Codorus Creek is three hundred and thirty-five, or six and one-quarter feet below the level of the flow line in the settling basin. It appears that once in seventy years a flood has attained the elevation of three hundred and forty-eight, in fifty years elevation three hundred and forty-five, in twenty years elevation three hundred and forty-two and about every tenth year three hundred and forty. So the settling basin will be flooded once in fifteen or twenty years. At such times, because the sprinkling filter surface is well above the seventy year freshet line, this filter can be operated and need never go out of commission. The filter is designed to be operated temporarily as a contact bed when desirable by means of a gate or stop planks on the main outlet drain.

The city purposes to purchase a farm of about one hundred and fifty acres upon which to locate the disposal plant. The nearest residence will be one-third of a mile distant; the next nearest three thousand five hundred feet. With good management there should be no odors noticeable six hundred feet from the works: The Northern Central Division of the Pennsylvania Railroad passes within this distance. The site is more secluded than that of numerous municipal disposal plants.

The proposed plans embody the essential elements of successful modern purification and are well adapted to the topographical and other conditions obtaining in the valley of the Codorus. They are adapted to produce efficiency at a minimum cost of operation and all that remains to be accomplished is the carrying out of the plans under skilled supervision and intelligent operation and maintenance of the works thereafter.

In order that the plant shall be satisfactorily operated, it is intended that two men shall be regularly employed, one of whom shall be capable of conducting analytical tests of the sewage and effluents and keep records, and the other a caretaker, besides doing such extra labor as may be required from time to time. The plans do not provide for the erection of a laboratory.

It has been determined that the interests of the public health demand that approval of the plans be given and a permit granted and such approval of the plans is hereby and herein given for the proposed sewerage and sewage disposal works and permission granted for their construction under the following conditions and stipulations:

FIRST: That if at any time in the future the Commissioner of Health shall determine that the storm overflows into the Codorus Creek are prejudicial to public health, or if, in his opinion, any other part of the sewerage system, or any part of the disposal works is inefficient or operated to the prejudice of public health, then such remedial measures shall be adopted by the city as the Commissioner of Health may approve or prescribe.

SECOND: At the close of each year's work plans of the sewers built during the year, together with such information in connection therewith as may be required, shall be filed in the State Department of Health.

THIRD: Monthly inspections of the sewer system shall be made by a proper official of the city and recorded in form, and copies of the same shall be submitted to the State Department of Health if required.

FOURTH: The by-pass from the pump well to the Codorus and the blow-offs on the force main and the drain pipe from the septic tanks and settling tanks shall be kept securely locked and shall not be used except when absolutely necessary. Notification of such use shall be promptly made in writing to the Commissioner of Health. The sludge drying area shall be trenched for the

reception of sewage as soon as the works are ready for operation, in order to prevent any accidental passage of sewage from the tanks over the surface of the drying area to the creek.

FIFTH: Since the owners of estates now connected with a private sewer in the city which is not to be incorporated in the public sewer system may not care to change over to the public sewer on account of expense entailed, the sewage from such private sewers may continue as now to go into the Codorus Creek unless such owner voluntarily connects with the city system, or he be compelled to so connect, it is hereby stipulated that the city authorities shall pass such adequate ordinances, rules or regulations necessary to compel the use of the city sewer system and the discontinuance of the discharge of all private sewers into natural water courses within the city limits, or upon failure to bring about such discontinuance, shall call the attention of the Commissioner of Health to the existence of such sewer outlets.

SIXTH: The city shall provide and maintain a laboratory in connection with the operation of the sewage disposal plant and shall place and keep in charge thereof a man capable of making adequate analytical tests and of keeping records, and such reports of the operation and maintenance of the disposal works as may be required by the Commissioner of Health shall be made to the State upon blank forms to be furnished by the State Department of Health. Such other proper and necessary attendants shall be employed at the works as may be necessary to secure satisfactory operation thereof.

SEVENTH: The especial attention of the city officials is called to the great importance of having the proposed plans of the sewage disposal works executed under the direction and supervision of the experts designing the plans, or of experts equally competent to carry forward the improvement.

EIGHTH: Approval to the proposed plans is given with the specific understanding that all objectionable industrial wastes are to be taken into the system, under such rules and regulations as the city may see fit to prescribe to protect the integrity or efficiency of the sewer system.

NINTH: No pathological material from any laboratory shall be permitted to enter the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

The attention of the local authorities is hereby called to the necessity of having city inspection of all house connections and of the desirability of the adoption of the regulation requiring untrapped house drains between the sewer and the house with a clear vent extending to above the roof of each building. While this condition is not precedent to the approval herein given to the proposed plan, the city is requested to give earnest consideration to the advisability of the adoption of such an ordinance.

Harrisburg, Pa., June 14th, 1907.

YORKVILLE, SCHUYLKILL COUNTY.

This application was made by the borough of Yorkville and is for permission to extend its sewer systems and to discharge sewage therefrom into a natural water-course at the boundary line between the borough of Yorkville and the borough of Pottsville.

It appears that on February nineteenth the electors of Yorkville and of Pottsville voted upon the proposition to effect a consolidation of these adjacent municipalities, and as soon as the proper papers are recorded, Yorkville will have become a part of the borough of Pottsville.

The population of Pottsville is about twenty thousand and Yorkville has about thirteen hundred. Both are located on the north side of Sharp Mountain between the east and west branches of the Schuylkill River. The southeastern part of Pottsville borders on the east branch of the Schuylkill River. This is at the gap where the river passes southerly through the mountains. Above the gap the river turns sharply from the east. Coming down from the north are the east and west branches of Norwegian Creek, which unites into one stream near the northern central part of the borough from whence the course is directly south to its junction with the river at the gap. It is along these streams in the borough that the principal industries and the railroads are located. For portions of their length in the municipal territory, the streams are walled and arched over. They receive the discharge of numerous rubble masonry and vitrified pipe sewers, all taking both sewage and storm water. The main thoroughfare of the borough is named Market street. It runs from the railroad at Norwegian Creek westerly to the Yorkville line and continues its course as Market street through Yorkville borough to the west branch of the Schuylkill River. Crossing this highway in Pottsville is a creek which rises near the Yorkville line and is an open creek for a distance of about two thousand feet, whence it flows through a rubble masonry sewer four feet in diameter to Norwegian Creek at the Pennsylvania Railroad Depot. This stream is named Cemetery Run for convenience.

The boroughs are in the East Schuylkill District of the Southern Anthracite Coal Fields, which terminates at Sharp Mountain. There are five collieries on the water shed of Norwegian Creek. However, all but two have been aban-

doned. They are located on the East Branch and undoubtedly render the waters of the creek acid, but no definite information is had on this subject. The Schuylkill River, however, is known to be the recipient of large quantities of acid mine drainage, which observations have proven to be clarifying and probably germicidal in action towards sewage pollution.

The suburb of Yorkville is composed of the homes of people employed in Pottsville. The district is on the mountain side, several hundred feet above the business section of the larger borough, so that its natural drainage facilities are good. The underlying rock is Pottsville conglomerate. It is practically impervious. The water supply is furnished by the Pottsville Water Company to practically everybody in the town. There are approximately four miles of mains in the borough, the smallest two inches in diameter and the largest eight inches in diameter. While the main supply is obtained from mountain streams impounded, Yorkville's immediate supply is drawn from a small earth distributing reservoir about one hundred feet square and twelve feet deep on the mountain side about one hundred and fifty feet above Market street and about a quarter of a mile therefrom.

There are reported to be six wells only in the town. The water contains dissolved iron and is not desirable.

The principal highways parallel Market street, so that they extend east and west. The larger part of the town slopes towards the West Branch of the Schuylkill River and is drained by a tributary called Cold Spring Run. The other part slopes to the east and is drained by Cemettry Run. Into each one of these streams a borough sewer now discharges. The one in the western district is twelve inches in diameter, begins at the summit near Franklin street and extends westerly in Market street to Hart street, and thence northerly to Cold Spring Run at a point about three thousand feet from the beginning of the sewer. This conduit receives kitchen wastes and some surface water. At present the population in the buildings connected with the sewer approximates two hundred people.

The sewer in the eastern district is from eight to fifteen inches in diameter. It begins in Franklin at Mahantongo street and thence through Franklin, Market and State streets to Cemetery Run at the foot of West End avenue. This point is at the borough line and there is a culvert in the avenue here. The total length of this sewer is about three thousand five hundred feet. It receives kitchen waste and some street drainage. There are two small private sewers in West End avenue which empty into the culvert. They serve possibly seventy-five people, and the State street outlet about four hundred people. No sewage other than sink drainage is permitted to be discharged into the sewers in the borough. Cemetery Run gives no evidence of sewage pollution, and the kitchen drainage discharged into it from the sewers has not caused a nuisance so far as the Department can learn.

There are two hundred and seventy-nine buildings in the borough, two hundred and seventy privies and nine cess-pools. About seven hundred people live in the dwellings whose kitchen water is emptied into the sewers, and the remainder dispose of waste water onto the ground or the street gutters. After storms Cold Spring Run and Cemetery Run are thoroughly flushed out, and this, coupled with the good grades in these streams, may account for the fact that no nuisances are reported to exist there even in the warm summer months. But the kitchen wastes which are allowed to flow to the street gutters in the vicinity of West End avenue in the Eastern District from stagnant pools in the highway create odors.

The petitioners represent that it is desirable that a twelve inch sewer be constructed in West End avenue from the culvert at State Street, westerly to Pine street, a distance of eleven hundred and forty feet. The proposed sewer is to take storm water and kitchen waste only. No water closet drainage is to be allowed to enter it. The object of the improvement is to abate a nuisance caused at the present time by kitchen waste in the gutters on West End avenue. Cemetery Run in Pottsville is not a nuisance, and the petitioners, therefore, represent that public health demands that the kitchen waste which now reaches the run in the street gutters be conveyed under ground to the run by the proposed sewer.

Pottsville is a manufacturing community. While it is in the anthracite coal fields, comparatively few miners reside within its borders. The stability of the town, therefore, would seem to be assured, apart from coal operations. It ranks, therefore, with municipalities which should plan or extend its public works in contemplation of future requirements. However, the conditions favoring the discharge of sewage into the streams in the coal fields have undoubtedly been accepted as sufficient to exempt municipal and private corporations from the further responsibilty relative to sewage disposal.

Both the East and West Schuylkill Rivers drain the coal measures and are, therefore, highly acid. On the West Branch are the east and west Schuylkill districts of the Southern Anthracite Coal Fields in which are located forty-seven collieries, fourteen boroughs, fifteen townships and an aggregate popula-

tion of sixty-five thousand three hundred and twenty-seven, census of nineteen hundred. On the East Branch there are thirteen collieries, five boroughs and nine townships, with an aggregate population of twenty-eight thousand two hundred and twenty-three. Both branches receiving the sulphurous mine drainage and large quantities of fine coal and culm are colored inky black and support chemical precipitating actions which cause a settling out of large quantities of suspended matters including bacteria and organic matter. Consequently, the channels of the stream have been gradually filling up. During heavy rain storms this coal waste, owing to its specific gravity, is moved further and further down the stream towards the lower river waters. During extraordinary freshets the entire length of the river to its mouth is freighted with coal.

During ordinary stages of the river the clarifying and purifying processes go on to a very large extent in the coal regions, and the suspended matters and floating bacteria are largely deposited along the beds of the stream there and in pools, especially at points where the velocities are checked. But during the times that the sediments are picked up and carried even to tide water, pathogenic pollution discharged from sewers would also be transported this distance and thus menace, to a greater or less extent, the lives of the people using these waters for drinking purposes.

It is possible for fresh sewage from Pottsville, together with deposits along the river below, to be brought down in freshet flow to the city of Philadelphia in twenty-four hours or less. And, therefore, at such times, Pottsville sewage is one of the sources of menace to the public water supplies in the valley. Since there is an aggregate population of ninety-three thousand five hundred and fifty, census of nineteen hundred, in the coal fields, whose sewage may reach the streams, this aggregate menace cannot be stopped except individual cases be acted upon. Pottsville's contribution to this menace is comparatively important. The borough is at the gateway out of the coal measures, and in the interest of consistent public policy it would seem essential that the disposal of sewage there should be revised, provided new methods of disposal are to be required anywhere in the coal measures.

If it should be found on examination that during ordinary times the sewage is thoroughly disinfected and that the danger to the water supplies down stream is only during storms, then treatment of the sewage would be absolutely necessary only during storms; but since it is impracticable to purify mingled sewage and storm water, it would be necessary in order to treat the sewage of the town during storms, that sewage only from the dwellings and buildings be delivered to the disposal works. Hence this requirement forecasts the necessity for the separation of sewage and storm water.

The places on the banks of the Schuylkill River below Pottsville taking their water supply from the river are Pottstown, Royersford, Spring City, Phoenixville, Norristown and Philadelphia. With the exception of Pottstown and Phoenixville, the places filter all or a part of the water supply.

The people in Yorkville desire to make the district attractive for residence purposes. Sewers will be extended and in time undoubtedly privies and cesspools abolished and all of the sewage delivered to the sewers. When that is done a nuisance will be created in the open ditch at the Yorkville-Pottsville line, unless Cemetery Run be converted into an arched sewer. Eventually the sewers in Yorkville east of the summit will be connected with the existing sewers in Pottsville. It does not seem to be necessary or desirable to disassociate the subject of proper sewage disposal for the east end of Yorkville and the entire borough of Pottsville; but the west part of Yorkville, sloping as it does to the west branch of the Schuylkill River a mile distant, must in the future provide for sewage disposal works there, or pump the sewage over the divide into the Pottsville system. In either case the sewers should be sanitary only, excluding storm water.

It has been unanimously agreed that the interests of the public health demand that a permit be granted and it is herein and hereby granted to the borough of Yorkville to build the proposed sewer and to discharge into it kitchen waste and storm water only, under the following conditions and stipulations:

FIRST: That nothing but kitchen wastes and storm water shall be permitted to enter the said sewer or the other sewers of the borough, until permission to do so shall be granted by the State Department of Health.

SECOND: That before further extensions to the sewer system in the borough shall be made, a plan of the entire borough shall be prepared and submitted to the State Department of Health showing proposed sewers for the entire borough and the method to be adopted for the disposal of the sewage therefrom, which plan may be modified, amended or approved by the Commissioner of Health.

THIRD: If at any time in the opinion of the Commissioner of Health the discharge of kitchen waste from the proposed sewer into Cemetery Run has become a menace to public health, then such remedial measures shall be adopted for the removal or abatement thereof as the Commissioner of Health may approve, advise or suggest.

FOURTH: This permit to discharge sewage into a natural water course shall cease on the first day of May, one thousand nine hundred and ten. If at that date the interests of the public health demand it, the Commissioner of Health may extend the time.

FIFTH: No pathological material from any laboratory shall be permitted to be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

Harrisburg, Pa., April 12th, 1907.

DESIGNS AND CONSTRUCTION.

THE ENGINEERING DIVISION DURING THE SUMMER MONTHS OF THE CURRENT YEAR PERFORMED CERTAIN WORK RELATIVE TO THE DEVELOPMENT WITHIN THE MONT ALTO STATE FORESTRY RESERVATION, FRANKLIN AND ADAMS COUNTIES, OF A NEW PUBLIC INSTITUTION FOR THE TREATMENT OF INDIGENT PERSONS AFFECTED WITH INCIPIENT TUBERCULOSIS, AND THE FOLLOWING IS A REPORT OF THE PRELIMINARY SURVEYS AND DESCRIPTION OF PLANS.

Report on Preliminary Work at the Pennsylvania State South Mountain Sanatorium.

The State Forestry Commission has acquired in Franklin and Adams counties about 50,000 acres of forest land extending for miles along the summits and slopes of the South Mountains in Cumberland, Adams and Franklin County. Most of the area is within the Cumberland Valley and is drained by the tributaries which finally join to make up the Potomac River.

The northern portion is known as the Caledonia Tract and the southern portion is known as the Mont Alto Tract. In the latter, the State Forestry Academy is located at the foot of the mountains near the village of Mont Alto on the Waynesboro Branch of the Cumberland Valley Railroad. Formerly the site of the academy was occupied by a charcoal iron furnace. The ore was mined in the vicinity. A large slag heap testifies to the industry having been an important one. A water privilege still exists on the property, the stream being the west branch of the Little Antietam Creek. Its head waters in the mountains rise in the tract it is proposed to utilize for the new sanatorium. Also in the reservation near the academy is a public resort known as Mont Alto Park. A branch of the railroad extends into this park.

The Caledonia Tract has the celebrated Chambersburg and Gettysburg turnpike extending through it east and west. Where the Conococheague Creek, which is a tributary of the Potomac and furnishes the water supply to the borough of Chambersburg, emerges from the mountains, there is a park called Caledonia Park in the State Reservation abutting the turnpike and from this park westerly in the turnpike there is a trolley line to Chambersburg, a distance of about nine miles. A tributary of Conococheague Creek also rises in the lands which it is proposed to utilize for the new sanatorium and it also drains the J. T. Rothrock Mountain Side Sanatorium, recently purchased by the Commissioner of Health for state uses and the adjoining South Mountain Camp Sanatorium.

The Legislature of 1903 made an appropriation for the erection and fitting of a sanatorium and for the maintenance thereof on the State Forestry Reservation at Mont Alto. Immediately thereafter

the Commissioner of Forestry selected the site of the present South Mountain Camp Sanatorium in Franklin County, within the bounds of the State Forestry Reservation and erected thereon a sanatorium for poor consumptives at a total cost for construction and maintenance for two years of $8,000.

At the present time, September first, 1907, this camp consists of an assembly hall, a single story frame building about forty feet square partitioned off into a kitchen and laundry, dining room and assembly hall, the cottage residence, of the manager and his wife who is the matron, one servant's cottage, the resident physician's office, (a frame building about 18 by 20 feet) six double cottages about 20 feet square, one single cottage 10 by 16 feet, ten cabins 10 feet by 10 feet, one spring-house 10 by 28 feet and a stable.

About three miles east of the academy and elevated about four hundred feet above it, 1,600 feet above mean sea level, on the northwestern slope of one of the local summits known as Snowy Mountain, the underbrush from a second growth has been cut and about eight acres enclosed in a wire fence along and south of a public highway. Here, among the trees, the above mentioned buildings have been erected, all of which are cheap, frame structures.

The accommodations are not in excess of thirty patients.

The water supply is obtained from a natural spring on the side of Snowy Mountain elevated 20 feet only above the kitchen and distant therefrom 1,200 feet. The spring is planked over and the water is piped to a small masonry reservoir about 8 feet square, from whence it is piped to the kitchen and the spring-house nearby. A stream is kept constantly flowing in the spring-house and to it the cottagers come to obtain water for drinking and washing. There is a spring 100 feet outside of the fenced enclosure and above it which is resorted to for drinking water. It is not walled up or protected. There is another spring in the camp below the building which it is said has been temporarily abandoned. However, there is a cup on the walled sides. Surface drainage may contaminate this spring as well as sub-soil drainage.

The waste water from the spring-house is drained to a cesspool located on the same level and 100 feet from this spring. All laundry and sink water from the kitchen and assembly hall is drained by a pipe into this cess-pool. It is a hole loosely walled up in swampy ground and covered over. The soil round about is saturated, as is evidenced by the rich growth of grass and weeds there. At the present time this drain is clogged up and not operated. The kitchen slops are received in a wooden tank and thence carried to open holes dug in the ground in the outskirts of the camp. Chamber lye and wash water from the cottages and cabins are carried in pails to and emptied into these holes.

Garbage is also deposited in open holes dug in the outskirts of the camp. Here also the privy buildings are located over earth vaults. The vaults are five to six feet square and ten to twelve deep. They are limed frequently and when the holes become filled up earth is thrown on top and the superstructure removed over a new hole. There are four such portable buildings. And the ground has become quite thoroughly dotted with these abandoned holes for excrement, garbage and slops. Lack of funds has been the chief

obstacle in the way of more sanitary methods of waste disposal. An attempt to burn the garbage has been unsuccessfully made in a locally improvised crematory.

Proposed Changes.

By Act of Legislature approved June first, 1907, the Commissioner of Forestry was authorized and directed to transfer to the Department of Health the Mont Alto Sanatorium, provided that in the establishment of sanatoria, or colonies for the reception and treatment of indigent persons affected with incipient tuberculosis, the Commissioner of Health, with the approval of the Governor, shall find it desirable to take over, control and manage said sanatorium. This has been done.

Under the Act of May 15th, 1907, providing for the establishment and maintenance of one or more sanatoria or colonies for the free care and treatment of indigent persons suffering from tuberculosis, the Commissioner of Health directed that preliminary surveys should be made for a new tract of land of not over 500 acres within the boundaries of the State Forestry Reservation in the vicinity of the existing State Camp at Mont Alto.

A surveying party was organized early in June and put in the field and since then has been engaged in making surveys for the development of a new sanatorium.

In the folio of maps, Sheet No. 1 shows the entrance from Mont Alto village to the present South Mountain Camp in the Mont Alto tract of the State Forestry Reservation. Sheet No. 2 shows the other entrance from Caledonia Park passing through the Caledonia tract of the State Forestry Reservation. Sheet No. 3 shows the topography and the mountainous district of the region and at once exhibits the configuration of the earth there and the drainage previously described. It was compiled from United States topographic and the State Geological Sheets and was adapted only for reconnaissance work.

Sheet No. 4 is a map showing the 100 acre tract on which is located the camp sanatorium transferred from the Department of Forestry to the Department of Health and also showing the proposed 500 acre tract for the establishment of the new sanatorium and also showing the J. T. Rothrock property.

The hundred acre tract has been arbitrarily defined. That is, the camp and the springs furnishing the water supply and the pine grove on the opposite side of the road are so located in the narrow land of the State land that to partition off any part of it by a true line would comprise over 100 acres as will readily appear to anyone examining the map. So, to avoid including over 100 acres two lines at right angles to the existing boundaries of the State property have been laid out to intercept and the area thus enclosed by these lines and the old boundaries comprising exactly 100 acres. The courses and distances appear on the map.

The Rothrock property comprising 57.75 acres, has been purchased and developed by Dr. J. T. Rothrock since the establishment in 1903 of the old State camp. It comprises the main building in which are located the kitchen, dining-room, laundry, servant's quarters and rooms for patients. A two story frame structure, six single cottages

and one double cottage for patients, a two story frame dwelling for the resident physician, a farm house, barn and other minor buildings, an acetylene plant, spring-house, pumping plant, water tower and pipe line. The buildings face the east and are located on the northeast slope of a tongue of land at the foot of Snowy Mountain Range. The western boundary line of this tract is the eastern boundary of the State Forest lands. There is a wooded strip of land about 1,000 feet wide separating the State Camp to the west from the Rothrock camp to the east. It is this intervening strip which has been included in the hundred acre tract pre-empted by the present State Camp. Because said State Camp could not be enlarged to the west on account of the wet and low land there, but could be enlarged somewhat to the east towards the Rothrock camp, and because provision for the accommodation of the State poor must be afforded at once while the larger and main colonies are being planned for, this land and the Rothrock property was accurately surveyed by specific directions from the Commissioner.

Sheet No. 5 is a topographical map showing the water works, drainage system, buildings, roads and proposed developments at both existing camps.

The drainage from the main building on the Rothrock property is conducted to a cess-pool and the sewage from the physician's residence is disposed of to the same cess-pool. The employees and cottages are required to use privies located on State land in the woods. The wash water and chamber lye from the cottages is carried in buckets to and emptied into a hopper connected with the sewer leading to the cess-pool.

The water supply is obtained from a spring at the spring-house which is located in a ravine above the buildings. The water is pumped by gasoline engine into a water tank, circular, holding 4,200 gallons and supported by timber sufficiently to afford a gravity supply to the main buildings. There are water closets in the physician's residence and the main building. Roof water is admitted to the sewers to give a flush.

Above this spring there is the Carbaugh Spring and there is a one inch pipe leading from it to the spring-house. There is a right to use from the Carbaugh Spring as much as the one inch pipe can discharge by gravity. On July 23rd, the flow at the spring-house was measured to be at the rate of 15,000 gallons per 24 hours. Since the capacity of the sanatorium is in the neighborhood of 20 to 30 patients, it is evident that this spring is sufficient to more than supply the drinking water. But there is not enough to furnish fire protection.

Proposed Developments.

In laying out plans for the development of an entirely new institution to accommodate possibly 3,000 patients, the Health Commissioner determined it to be economical to develop land adjoining the two present camps, and to plan sewerage and water works in such a way that these can be afforded to the present camps in accordance with a comprehensive plan adapted to the extension to the new sanatorium as the various colonies are added in the future. Therefore, the topographical surveys were extended over

a larger area than 500 acres specified by the act, in order that there might be a choice and to permit the selection of the tract best adapted for the purposes.

Sheet No. 6 is a map showing the topography, roads, streams, springs and land lines from the State Forestry Academy to the existing camps, all within the Mont Alto tract of the State Forestry Reservation in Franklin County and plotted from surveys and triangulation made during the summer to assist in the development of the new sanatorium. This map has been the basis for the laying out of the 500 acre tract, whose courses and distances appear on Sheet No. 4. It will appear to any one examining the same that the tract embraces Moneghan's Ridge and the saddle between it and Rocky Mountain point and the southwesterly slopes of these mountain ridges, the level tract below, known as Moneghan Field, and the lower slopes of the rising ground toward the steep sides of Snowy Mountain. This was selected as an exceptionally well protected, drained and elevated site for the new sanatorium. Moneghan Ridge and Rocky Mountain Point have elevations respectively of 1,680 and 1,780 feet above mean sea level, which is 800 feet or more higher than the valley of Mont Alto village. The view commanded on these summits is an extensive one.

The matter of transportation of commodities over the rough roads up this incline is a subject of some importance. A project has been under consideration for the possible extension of the electric railway from its present terminus at Caledonia Park southerly to Mont Alto village connecting with the South Mountain sanatorium. Folio Plan No. 7 shows the possible route for such a line.

Sheet No. 8 shows the scheme of the new sanatorium on the south slopes of the ridges, the highways and streets and drives, lawns, cottages, pavilions and the location of the infirmary, nurse's home, power house and laundry, superintendent's residence, the dining-hall, chapel, employee's home, hospital and administration building and officer's residence. Also the sewer system proposed and the possible trolley location, all within the said 500 acre tract; this lay-out being arranged in conformity with the specific directions of the Commissioner of Health, all as given above in detail.

On account of the unsanitary conditions at the existing camp on the State property and the necessity of providing adequate and modern apparatus for the destruction of all sewage and pathogenic matter after the same has been speedily removed from the vicinity of the cottages and other buildings, surveys and plans have been made and specifications and contracts prepared for the immediate construction of sanitary sewers for the existing camp. The plans and profiles thereof are shown on Folio Plans Nos. 9 and 14, inclusive. The outfall sewer will pass down below the site of the proposed infirmary and will be large enough to serve all of the sewers of the new sanatorium when they are built. It will be ten inches in diameter and lead down the valley of Rocky Run a sufficient distance below the 500 acre tract to a secluded site well adapted for the location of sewage disposal works consisting of a septic tank, sprinkling filter, designed to be operated in freezing weather as a contact bed, and filters and sterilizing basins. These

precautions are necessary, it would seem, since a few miles below the waters of the stream afford the source of supply to the borough of Chambersburg. That municipality has been required to submit plans for the filtration of its water supply to the Commissioner of Health for approval. The Conococheague watershed is quite extensive and there are numerous menaces on it which the officers of the Department are now investigating and ordering abated. It would not be consistent for the State institution to add sewage to Chambersburg's water supply.

The sewer system cannot be operated unless more water than it is possible to supply from the existing water works system be furnished. The State camp, where sewers are needed most at once, is very deficient in water supply. It is possible to pipe water from springs on the slope of Snowy Mountain and bring it in by gravity to the present State camp. Thus all the water needed for domestic purposes at both of the existing camps can be obtained, but the elevations of the springs are such that the water cannot be delivered by gravity to the entire development proposed. Pumping must be resorted to. Plans are now being perfected to furnish an ample supply for general, laundry and superior and inferior domestic uses for the cottages, infirmary, hospital, dining-hall, laundry and other buildings, and for fire purposes.

Proposed Sewerage System.

The proposed sewerage system is designed to entirely relieve the inadequate and unsanitary equipment that exists at present, and to furnish the nucleus for a system which will take care of a possible future population of three thousand persons. The system is designed on the separate basis. The surface run off from rain, springs and streams will follow the natural drainage of the land and most of it will empty into Rocky Mountain Creek. The swamps and low spots will also be drained by ditches into this creek and surface gutters will carry the storm water from the roofs of the buildings to the same point. The sanitary system of sewers will carry all excrement, slops, kitchen and laundry wastes, and all other sewage resulting from domestic uses.

The large buildings, such as kitchens, laundry, dining-halls, administration building and resident physician's house, will be equipped with plumbing and sewer connections. The cottages will have no plumbing connections. Sanitaries containing the water closets and hoppers will be placed in the 25 foot alleys, running parallel to the long side of the 105 by 300 foot blocks. They will be placed in alternate alleys and will be spaced between the centres of adjacent blocks. Each will be connected to the sewer passing under it by vertical pipes. Each sanitary will be equipped with five water closet connections and one hopper for slops and other liquid waste.

The sanitary system is designed to carry the sewage from a settlement of 3,000 people on the assumption of a flow of 60 gallons per capita, which equals the assumed water consumption.

The total population at present at the camps does not amount to over 100 persons. Sixty new cottages are to be built in the near future which will accommodate eight people in each and will bring

the population up to nearly 600. These cottages are to be located at the upper camp and will be supplemented with additional cottages at this point in the near future. An infirmary is to be built on the slope of Rocky Mountain Ridge in the northwestern part of the 500 acre tract and plans have been prepared for extensive developments along the higher part of the plateau in the western part of the tract. It is planned to place most of the new cottages in the future in this western part and if the plans that are now prepared are carried out the population in a few years will amount to 3,000 people, with a distribution of 2,000 in the western part and 1,000 in the eastern part of the tract. The lots for this future development and also for the present developments are being laid out in rectangles 105 by 300 feet. In each of these blocks will be placed ten cottages in two rows and facing 45 degrees from the north. The blocks will be separated by alleys 25 feet apart and at the end of each block there will be a small block 105 by 50 feet, containing pavilions for the patients.

The hospital and large buildings will be surrounded with parking and parks will be left at intervals throughout the sanatorium.

The population will consist almost entirely of persons suffering from tuberculosis in its various stages. The infirmary will contain the advanced cases and the cottages will be used for incipient cases. The only inhabitants free from the disease will be the doctors, nurses and attendants, who will constitute a small minority.

Practically the entire tract is drained by the head-waters of Rocky Mountain Creek. This creek starts in the central part of the tract and is formed from several small creeks which are fed by numerous springs. It flows north through the tract and empties into the Conococheague Creek near Caledonia, five miles north of the sanatorium. The Conococheague flows from this point west in a circuitous route through the towns of Fayetteville and Scotland, thence to Chambersburg, fifteen miles distant or twenty miles from the sanatorium, and thence south to the head waters of the Potomac.

The sewer system is to consist of a main trunk sewer ten inches in diameter and two eight inch trunk sewers which will carry the sewage from the present camps and the future extensions in the new western camp respectively.

The ten inch trunk sewer begins at the junction of the eight inch sewers on the west bank of Rocky Mountain Creek at a point 1,000 feet south of the northern boundary of the 500 acre tract. It extends northward along the west bank of this creek for a distance of 3,000 feet to a point where there is a natural site for a disposal plant. The junction point at the head of this trunk sewer is low enough to allow the eight inch sewers to drain the whole tract, with the exception of a field to the east and north of the upper camp, and a small section to the south of Moneghan Field in the 500 acre tract.

The eight inch trunk from the junction to the present camps is now being constructed. It is 3,300 feet long and is fed by a series of six inch laterals. It extends from the junction point, southeast through the timber growth to the main Mont Alto road, and thence along this road in an easterly direction to the present camps. The other eight inch trunk will not be built at present but will be

constructed as soon as the development in the western tract begins. It will extend south from the junction, passing through the centre of the 500 acre tract to the southern boundary. It will be fed by a system of six inch laterals which will extend along the rising ground to the west of this sewer.

The laterals are designed to pass directly under the sanitaries and hoppers. This will give a lateral for each alternate longitudinal alley.

At present there are six laterals to be constructed, a total length of 3,200 feet.

These laterals are all located in the present settlement. They consist of six inch pipe and will be connected with the new sanitaries and the existing buildings. They will furnish sufficient connections for the present development, including the 60 new cottages and new dining-room.

The minimum grades used in the design of this system are much higher than those used in ordinary practice. This has been done in order to insure a rapid run-off of the sewage which will be much more concentrated than that found in ordinary combined sewers. The grades in nearly all cases follow the general slope of the ground, allowing a covering of three feet of earth above the top of the sewers. In some cases it has been necessary to increase this depth due to irregularities in the slope of the ground surface so that the depth of cover for the sewers varies from 3 to 9 feet. The average depth ranges between 4 and 5 feet.

Manholes have been placed at every change in line and grade and at the end of every sewer line. Each manhole on the eight inch and six inch sewers will be supplied with a flap valve on the outlet sewer, and with a one inch connection with the water mains. This will allow each manhole to be operated as a flush tank and will furnish adequate flushing facilities. The manhole covers will be perforated to furnish ventilation for the system.

All kitchen connections will be furnished with grease traps. At present a large concrete grease trap is being constructed for the kitchen at the lower camp.

The materials to be used in the construction of this system are all the best of their several kinds. The sewers are to be built of the best terra cotta sewer pipe with deep and wide sockets. The joints will be made of neat Portland cement.

The manholes will be built of first class Portland cement concrete with cast-iron frames and covers.

The grease traps will be built of the same material and will be furnished with wooden baffle boards.

There will be built at present 10,200 feet of sewer of the sizes stated above, 29 manholes and one grease trap.

Sewer Contract.

Sealed proposals for the construction of a portion of the system of sewers for South Mountain Sanatorium near Mont Alto, Franklin County, for the Commonwealth of Pennsylvania, Department of Health, were received by the Commissioner on the 24th day of September, 1907.

The engineer's estimate of the work to be done, under the plans and specifications, by which the proposal was compared, was as follows:

400 lineal ft. 10 in. terra cotta sewer over five feet deep.
1,800 lineal ft. 10 in. terra cotta pipe sewer 4 to 5 ft. deep.
800 lineal ft. 10 in. terra cotta pipe sewer 4 ft. or less in depth.
50 lineal ft. 8 in. terra cotta pipe sewer over 6 ft. deep.
500 lineal ft. 8 in. terra cotta pipe 5 to 6 ft. deep.
2,400 lineal ft. 8 in. terra cotta pipe sewer 4 to 5 ft. deep.
318 lineal ft. 8 in. terra cotta pipe sewer 4 ft. or less in depth.
150 lineal ft. 6 in. terra cotta pipe sewer over 6 ft. deep.
2,450 lineal ft. 6 in. terra cotta pipe sewer 4 to 5 ft. deep.
130 lineal ft. 5 in. terra cotta pipe average 6 ft.

There will be approximately 3,600 cubic yards excavation in sewer trench of which 2,600 cubic yards may be earth and loose rock excavation and 1,000 cubic yards solid rock excavation.

Two five in. Y branches in 8 in. sewer pipe.
Forty 4 in. Y branches on 6 in. sewer pipe 3 ft. lengths.
Twenty-nine cast-iron manhole frames and covers.
160 lineal ft. of concrete manhole construction.
One concrete grease trap.

The above quantities are approximate only and are made up for the purpose of comparing the bids. They may be increased or diminished as necessity may require, and the contractors will not be entitled to any claim for damages, loss or profit, excessive costs, or otherwise, if the amount of the work actually done differs from the amount herein estimated.

The canvass of the bids received is given in the following table:

Number.	Items.	Contractor's Name.											
		Chambersburg. Hiteschew & Gillan.		Harrisburg. Brady & Snavely.		Harrisburg. J. N. McCulloch.		Chester. M. Bunyea & Co.		Harrisburg. United Ice & Coal Co.		Harrisburg. C. F. Hessenberger.	
		Unit price.	Total.	Unit price.	Total.	Unit price.	Total.	Unit price.	Total.	Unit price.	Total.	Unit price.	Total.
1	10-inch sewer (400 feet), 5 feet deep and over, ...	$2 00	$800 00	$1 08	$432 00	$1 30	$520 00	$2 25	$900 00	$2 00	$800 00	$0 96	$384 00
2	10-inch sewer (1,800 feet), 4 feet to 5 feet deep, ...	1 90	3,420 00	1 08	1,944 00	1 25	2,250 00	2 15	3,870 00	2 00	3,600 00	0 73	1,314 00
3	10-inch sewer (800 feet), 4 feet deep or less, ...	1 80	1,440 00	1 08	864 00	1 225	980 00	2 00	1,600 00	2 00	1,600 00	0 71	568 00
4	8-inch sewer (50 feet), over 6 feet deep, ...	2 10	105 00	0 99	49 50	1 04	52 00	2 00	100 00	1 60	80 00	0 89	44 50
5	8-inch sewer (500 feet), 5 feet to 6 feet deep, ...	1 85	925 00	0 99	495 00	0 99	495 00	2 00	1,000 00	1 60	800 00	0 70	350 00
6	8-inch sewer (2,400 feet), 4 to 5 feet deep, ...	1 80	4,320 00	0 99	2,376 00	0 94	2,256 00	1 85	4,440 00	1 60	3,840 00	0 68	1,632 00
7	8-inch sewer (318 feet), 4 feet deep or less, ...	1 70	540 60	0 99	314 82	0 90	286 20	1 75	556 50	1 60	508 80	0 60	190 80
8	6-inch sewer (150 feet), over 6 feet deep, ...	2 00	300 00	0 925	138 75	1 00	150 00	0 75	112 50	1 40	210 00	0 67	100 50
9	6-inch sewer (2,450 feet), under 6 feet deep, ...	1 70	4,165 00	0 925	2,266 25	0 855	2,094 75	0 65	1,592 50	1 40	3,430 00	0 50	1,225 00
10	5-inch sewer (130 feet), average 6 feet deep, ...	2 00	260 00	0 90	117 00	0 90	117 00	0 75	97 50	1 25	162 50	0 63	81 90
11	5-inch Y on 8-inch sewer (2), ...	0 40	0 80	0 35	0 70	3 00	6 00	1 00	2 00	2 50	5 00	1 33	2 66
12	4-inch Y on 6-inch sewer (40), ...	0 30	12 00	3 00	120 00	1 50	60 00	0 90	36 00	2 00	80 00	1 07	42 80
13	Vert. ft. mh. (160 feet), ..	4 00	640 00	8 15	1,304 00	12 00	1,920 00	9 00	1,440 00	9 00	1,440 00	15 00	2,400 00
14	Mh. frame and cover (29),	15 00	435 00	15 00	435 00	12 00	348 00	15 00	435 00	15 00	435 00	20 00	580 00
15	Concrete grease trap, ...	25 00	25 00	110 00	110 00	125 00	125 00	100 00	100 00	100 00	100 00	90 00	90 00
16	Rock cut per cu. yd. (1,000),	0 50	500 00	1 50	1,500 00	3 00	3,000 00	4 00	4,000 00	2 00	2,000 00	2 00	2,000 00
	Total, ...	.....	$17,888 40	.....	$12,467 02	.....	$14,659 95	.....	$20,282 00	.....	$19,091 30	.....	$11,006 16

The award was made to Mr. C. F. Hessenberger because his aggregate bid was the lowest. On September 26th, 1907, a contract was executed between the Commonwealth of Pennsylvania, Department of Health, acting by and through its Commissioner, and the said Hessenberger for the construction of a part of a system of sanitary sewers at the sanatorium. At the close of the year, the work called for by the contract had not been completed.

Proposed Sewage Disposal Works.

Rocky Mountain Creek, as herein stated, furnishes the drainage outlet for practically the entire area of the sanatorium. The drainage area above the disposal plant is a little over a square mile. This creek has a very small flow in summer, less than the ultimate flow of the sewers, and in addition feeds the Conococheague Creek, which furnishes the water supply for the town of Chambersburg, 20 miles distant.

It is imperative that no sewage pollution should be added to the stream. The nature of the institution's sewage, impregnated as it will be with tubercle bacilli, must be considered. It has been deemed necessary to provide for an effluent from the disposal plant free from all pathogenic organisms. The disposal works have been designed on this basis.

The plant is to be located on the west bank of Rocky Mountain Run, 2,000 feet north of the boundary of the 500 acre tract. The land belongs to the State of Pennsylvania, under control of the Forestry Department, and has a slope towards the creek of 10 feet per hundred. The tract set apart for the disposal plant consists of 21.75 acres and is ample for all future developments. The plant will consist of septic tanks, sprinkling filters, sand filters and a sterilizing tank. The flow of the sewage will be by gravity through the plant and the dosing will be controlled by automatic apparatus.

The plant is so arranged that the sewage can be bypassed around any or all of the various compartments and can be operated automatically or by hand. The present units in each group are duplicated and arrangements are made for making the units in the future groups of larger sizes. It is designed for an ultimate capacity of 180,000 gallons per day, representing the sewage from 3,000 people.

The section of the plant to be built immediately will take care of 18,000 gallons per day, or the sewage from 300 people.

The septic tanks which will be built now consist of two covered concrete compartments, each 30 feet long, 4 feet wide and 10 feet deep, with an effective depth of $7\frac{1}{4}$ feet. Each compartment has a total capacity of 6,500 gallons which allows the sewage when flowing at a rate 50 per cent. in excess of the mean daily flow to pass through the compartment in 12 hours with a velocity of $2\frac{1}{2}$ feet per hour. Each compartment is independent of the other. The sewage enters through a small grit chamber and passes through a screen into an open trough from which it flows through valved openings into each tank or may be bypassed around the tanks. The sewage is distributed across the inlet end of the tanks by means of a stationary wooden baffle.

The flow through the tank is regulated by a movable wooden baffle which can be shifted along the tank to any desired position by means of a rope connection. The outlet consists of a weir 3 feet 6 inches long, over which the effluent passes for aeration and drops one foot into the open outlet trough. The outlet weir is protected on the interior by a wooden scum board which prevents scum and other solids from passing over the weir. Each tank is equipped with two 4 inch air vent pipes, sludge pipe and low water pipe. The low water pipe will only be used for draining off the sewage before cleaning the tank. It is located at a depth of 4½ feet below the flow line and is controlled by a 6 inch sluice gate valve with connections. This water will be carried to the sand filter dosing tank through a six inch terra cotta line.

The connections for draining the sludge are at the bottom of the tanks at the outlet ends. They consist of 8 inch sluice gate valves with connections to a 10 inch terra cotta pipe line. This line leads directly to the sand filters and the sludge will be distributed over the top of one of these filters.

Both tanks are built of reinforced concrete with reinforced concrete inlet and outlet troughs and reinforced concrete roof. The ground level is placed one foot below the top, or two feet above the flow line, so that the sewage will be well protected from changes of temperature.

The effluent from the septic tanks passes into a manhole which is also connected by a bypass to the inlet sewer. This manhole is arranged with weirs for dividing the flow proportionally for the dosing tanks of the different groups of sprinkling filters. It is also equipped with a bypass to the manhole that controls the flow to the sand filters so that the effluent may be passed around the sprinkling filters.

At present there are to be built two sprinkling filters of one group of four. These filters are 14 feet by 30 feet in plan with an average effective depth of 6¼ feet. Each is designed to take a flow of 9,000 gallons of sewage per day operating at a rate of 1,000,000 gallons per acre per day. The filters are filled with broken stone in graded sizes ranging from one inch on top to five inches on the bottom. The bottom is drained by a 12 inch circular concrete outlet through the centre, connected with 10 inch half tile laterals with loose joints laid on the concrete bottom 4 feet centre to centre. These outlet pipes are made large to allow a free circulation of air to pass through them and up through the filters.

The walls are constructed of reinforced concrete and rise one foot above the top of the exterior earth bank and the surface of the filters. The sewage is distributed over the surface by means of eight Columbus sprinkling nozzles spaced 8 feet centre to centre, on 3 inch vertical cast-iron risers, which connect with a 6 inch inlet line placed in the bottom of the filter. This inlet line connects with the dosing tank. The sewage will be distributed by this dosing tank alternately. On each of these filters. The dosing tank is located at the centre of a group of four filters. It is constructed of reinforced concrete with a wooden roof, has a capacity of 600 gallons and an effective depth of 3 feet. The bottom is at an elevation of 3½ feet above the flow line of the filters, which gives a working

head ranging from 2½ to 5½ feet, allowing a loss of one foot due to friction. The doses for the 18,000 gallon flow will be applied every 48 minutes and for the completed group every 24 minutes.

The doses can be applied either automatically or by hand. The automatic devices consist of the well known Automatic "Aerlock" Siphons and Sluiceways, manufactured by Merritt and Company of Philadelphia, Pa. These sluiceways have no moving parts and no subsidiary passage ways. The seals to the sluiceways are formed by air which is forced in and out through piping connected with bells in the outlet compartments of the dosing tank. The apparatus is so arranged that the filters can be dosed in rotation or that any one or more can be cut out. The operation by hand is controlled by a system of sluice valves which, of course, require the constant attendance of an operator.

These sprinkling filters are designed to be operated as contact beds in winter, either automatically or by hand. The sewage will be admitted through an inlet pipe from the dosing tank to a point two feet below the surface of the filter. It will take eight hours to fill the filter to a depth of four feet. At this depth the outlet will open and discharge slowly through a cramped valve, taking from one to two hours to discharge. This will give the sewage an eight hour contact and will allow the last sewage that has entered to have a two hours contact.

The operation of the filters as contact beds will be controlled automatically in a manner similar to the operation of the sprinkling filters. They can also be operated by hand.

The effluent from the sprinkling filters and contact beds passes through the system of underdrains described above and flows into the outlet chamber. This chamber contains the automatic apparatus for operating the filter as a contact bed and the necessary valves for operating it by hand. The outlet pipes from these outlet chambers connect with a manhole arranged with weirs for proportionally dividing the effluent for the different groups of sand filters. There is also a bypass from this manhole to the sewer passing around the sand filters to the chemical dosing tank.

The sand filters are designed to operate with a flow of 100,000 gallons per acre per day. For the present plant for 300 people, two units 40 by 100 feet will be required. These filters will have an effective depth of 3 feet 3 inches. The walls will be earth banks 3 feet wide on top with a one to one slope on the interior and a one and a half to one slope on the exterior. The walls will extend one foot above the surface of the filter. The interior slopes and bottom will be lined with concrete laid in blocks 10 feet by 10 feet by 6 inches, with asphaltum joints. The bottom will slope 6 inches from each side in the 40 foot direction to the centre through which will extend a 10 inch drain. The filters will be filled with a coarse silicious sand which can be obtained in this region. Sewage will be distributed over the surface by a system of wooden troughs connecting with the sludge pipe at one end and with the outlet from the dosing tank at the other end. In winter the surface will be furrowed and the sewage will be distributed in that manner to prevent freezing.

The arrangement of the dosing tank, location, and operation are identical with those of the dosing tank for the sprinkling filters. The tank is to be built of reinforced concrete with a concrete roof, will be 10 feet by 17 feet, with an effective depth of 5 feet. The bottom will be one foot above the surface of the sand. It will have a capacity of 5,000 gallons which will give a dose every 6 2-3 hours with the sewage flow of 18,000 gallons per day. This dose will be automatically discharged upon the filters in turn or any filter can be cut out. The automatic devices are identical with those used in dosing the sprinkling filters. The dose can also de discharged by hand in a manner similar to that used for the sprinkling filter.

Sludge will be run upon the surface of a filter through the 10 inch sludge mains. It will then be spread out over the surface and allowed to dry. The top layer of sand containing this dry sludge can then be removed.

The outlet pipes from the sand filters connect with the 10 inch main sewer through manholes and the outlet gravitates to the chemical dosing tank. The chemical dosing tank is to be used to sterilize the effluent from the disposal plant with chlorine before it enters the creek.

The plant consists of a tank for mixing and storing the sewage, two barrels for mixing and storing the chemicals, an orifice feed box for dosing the sewage and a rubble masonry superstructure. The tank is 7 feet by 7 feet by 4 feet, effective depth. The walls are built of rubble masonry, the sewage enters at one end, passes around a wooden baffle and flows through an opening at the other end into the ditch leading to the creek. The sewage is charged with the chlorine before entering the tank and will take over one hour to flow through the tank at its maximum rate.

For sterilizing the sewage, hypochlorite of lime, or bleaching powder, will be used. This comes in 30 pound cans at four cents per pound, with 34 per cent. of available chlorine. It will be mixed in the barrels in a concentrated solution of 50 pounds per barrel of water and will be fed to the sewage through an orifice box at the rate of five parts of available chlorine per million parts of sewage.

The orifice box is connected with the inlet sewer by a one inch brass pipe and feeds the chemicals by gravity. The superstructure for this apparatus will be placed on top of the sewage tank. It will be built with 12 inch rubble masonry walls and will be 7 feet by 7 feet by 7 feet high. It will contain the mixing barrels, orifice box, storage for chemicals and a stove for winter service.

It is proposed to install the septic tanks, sprinkling filters, with apparatus and piping, and the chemical dosing tank immediately. The sand filters will not be installed until next year.

Sewage Disposal Contract.

On October 30th, 1907, the Commissioner of Health received proposals for the construction of the sewage disposal plant. The work to be done consisted of the complete construction of two reinforced concrete septic tanks, each 4 feet wide by 30 feet long by 10 feet deep; two sprinkling filters of reinforced concrete, each 14 feet by 30 feet by 7 feet deep; one reinforced concrete dosing tank

for the filters; one chemical mixing tank and superstructure; excavation for a future sand filter; and all clearing, ditching and pipe laying necessary for completing the plant and placing it in working order.

The proposals were based on a lump sum for the whole work and were as follows:

Brady and Snavely, Harrisburg, Pa., ...	$6,595 00
W. B. Bunyea, Chester, Pa., ...	8,000 00
C. F. Hessenberger, Harrisburg, Pa., ...	16,350 00

The contract was signed on October 31st, 1907, by Brady and Snavely of Harrisburg, Pa., as they were the lowest bidders. They furnished a bond for $2,500 with the Pennsylvania Surety Company of Harrisburg, Pa., as bondsmen. At the close of the year the work called for in the contract had not been completed.

Bids for dosing apparatus were secured and Merritt and Company, of Philadelphia, Pa., were the lowest bidders.

Conclusions.

It is proposed:

FIRST: That the use of all cesspools, privies and vaults shall be discontinued and that all sewage at the institution shall pass into the sewers and thence to the disposal plant.

SECOND: That the size of the disposal plant as now provided for under contract shall be increased as soon as the population is increased beyond 300, for which the plant is at present designed, and that the size at all times shall be sufficiently large to furnish adequate disposal for the sewage at the rates set forth in this report.

THIRD: That the disposal plant shall furnish a practically pure effluent, free from any trace of pathogenic bacteria and that analyses shall be made at frequent intervals to determine whether these results are being attained.

Special Construction Work at Mont Alto.

The resident engineer acted in the capacity of superintendent of the camp in directing the laboring force. Streets and alleys were laid out to the lines and grades given for new buildings, clearings were made for future extensions and the camp was supplied with wood for fuel. An ice pond was constructed and an ice house erected. Some streets were graded and these operations required much of the time of the resident engineer.

POLK STATE INSTITUTION.

During 1907 complete surveys were made at the State Institution for Feeble Minded of Western Pennsylvania, Polk, Venango County, Pa., for improved sewerage and sewage disposal works. This work was carried on by Major D. F. A. Wheelock, with his private engineering corps under the supervision of Mr. Fleming, Principal Assistant Engineer of the Department and was done in accordance with Act No. 355 of 1907.

Special Work.

During the year special work has been performed by the Engineering Division relative to sanitation at Mt. Gretna, also relative to the water supply to the public on passenger coaches and at stations of railroad corporations in Pennsylvania, and with respect to water supply and sewerage at the Danville State Hospital, the Warren Hospital, the Central Poor District at Retreat and concerning other miscellaneous matters hereinafter mentioned.

(a) MT. GRETNA.

Harrisburg, Pa., July 2nd, 1907.

General Thomas J. Stewart,
Adjutant General, State of Pennsylvania,
Harrisburg, Pa.

Dear General:—

On May 18th, 1907, at your request, I began a sanitary survey of Mt. Gretna and the valley of the Conewago Creek in Lebanon and Dauphin Counties, Pa., with a view of putting into effect such precautionary measures prior to the encampment of the National Guard at Mt. Gretna, as the investigations might prove necessary. This work has been thoroughly and efficiently performed by the Engineering Division of my Department, F. Herbert Snow, Chief Engineer, in charge.

Every estate in the entire valley has been inspected and outside of Mt. Gretna Park five nuisances only found. They have been abated. They are indicated on the accompanying map.

Above Beverly, samples of water from all of the springs, wells and cisterns were tested and 19 of them found bad. These are located on the said accompanying map. I have posted warning signs on the ground.

There were nine cases of typhoid fever and two deaths in the valley below Mt. Gretna in 1906 and four cases in the military camp. These are located on the said accompanying map. I have had the properties examined to see that no infection still exists.

Tests of the creek on the State Rifle Range showed the water to be polluted, also its source, the spring at Grant Fisher's house. I posted a warning sign there and along the creek. Stewart Spring on the hill which supplies the Range should be immediately cleaned out. The walls about this spring should be carried up considerably higher and brought nearer together to keep out surface water and

the overflow should be arranged so that no pollution of the spring by footwear can result when one wishes to drink from the spring. Preferably the spring should be fenced in.

I have ordered the Pennsylvania Chautauqua Association to submit plans of its sewerage system and sewage disposal works on or before July 15th. I have notified the Association that human life is imperiled by the inadequacy of the present plant to treat sewage and have requested prompt action.

The creek below Conewago Lake is totally unfit for use by man or beast, and I have had warning signs posted along its banks all the way down to Beverly. Furthermore, I have condemned Conewago Lake as a source of drinking water and have ordered said Association to discontinue its present pipe connection between the lake and the pump house. Warning signs have been posted around the lake. The water works systems are indicated on the accompanying map. The water supply on the ground of the United Brethren Camp Meeting is good, but I have advised the boiling of all water supplied from the dam north of the railroad track. The springs in the grounds are dangerous now although they test all right. The platforms above may admit pollution directed to the spring below. I have made certain requests of the Association respecting the enforcement of sanitary regulations in its grounds. I have ordered reconstruction of certain privies, the abandonment of a drain from a laundry to the run, leading to the lake and have ordered the prohibition of all washing in the run or creek and the discharge of wash water, slops and rinsings on the ground anywhere, except into the sewers or other proper receptacles ordered provided for the purpose. I have requested a patrol and the Department will maintain one and collect daily samples of the drinking water.

At the picnic grounds where many thousands of people congregate single days, the sanitaries are totally inadequate to accommodate the crowds and they are not cleanly. In consequence, sanitary nuisances are committed all through the woods and bushes around the lake and on the watersheds contributing to the picnic ground water supply and the supply to the military reservation. Any springs within this territory into which surface water may flow is menaced. I do not want to close up the beautiful springs in the park and I have requested the management to immediately wall up the springs to keep out surface water and to provide suitable overflow sills to prevent pollution of the water by footwear. I have also requested that a sanitary patrol be maintained by the owners and also by the ice companies in order that Conewago Creek and the surface of the ground shall not be polluted. I apprehend, however, that the customs will not cease, and I shall maintain a Department patrol and daily analyze the waters and if necessary close all springs. I have forcibly called to the attention of Mr. A. D. Smith, the necessity for the establishment of a sewage system for the picnic grounds and for the filtering of the surface water supplied there. As a precaution I have advised and requested him to see to it that only boiled water be used for domestic and culinary purposes at the grounds. I beg to call your attention to the details in the accompanying report, especially as they relate to military reservation.

I have requested Mr. A. D. Smith to establish an approved filter plant for the purification of all surface water furnished to the camp site. This will take some time. You will note that the deep well water recently tested may ultimately prove all right, but I am not yet willing to give my approval to this source. However, an accident to the suction plunger will probably eliminate this source during the present encampment.

I wish to emphasize the necessity of your requiring that no unboiled water should be used at the camp, and that drinking water from any stream be prohibited. Copies of the warning signs placed at springs, wells and streams, are being sent you under separate cover. I beg to respectfully suggest the advisability and necessity of the maintenance of a military patrol in the woods north of the railroad above the dam and the pump house where the camp's water supply is obtained and on the watershed thereof to prevent civilians from committing nuisances there. And I request that orders be issued forbidding the men to enter these woods. I have posted signs on this stream above the dam in anticipation of accidental pollution.

I have advised Mr. Smith to consider the project of a general sewerage system and sewage disposal works for all of the grounds, camps, and the State Rifle Range and beg to suggest that the State can reasonably afford to contribute towards the cost of the sewers.

The accompanying report shows in detail the bacteriological and chemical tests of the different waters, contains copies of orders and communications from the Department to the various private corporations, associations, companies and individuals concerned and a full description of the results of the sanitary survey, the location of all nuisances, condemned wells, springs and streams, typhoid cases, water works systems and sewage works with discussions and recommendations.

Yours truly,
(Signed) SAMUEL G. DIXON, Commissioner of Health.

REPORT ON SANITARY SURVEY OF MT. GRETNA PARK AND CONEWAGO CREEK VALLEY, AND MATTERS RELATIVE THERETO.

General Conditions.

Mt. Gretna is a camp settlement on the Cornwall and Lebanon Railroad, in South Londonderry and West Cornwall Townships, Lebanon County, Pennsylvania. It is located near the head waters of the Conewago Creek. This stream flows in a generally southwesterly direction for about eighteen miles to the Susquehanna River. At its mouth is Falmouth Station, Conoy Township, Lancaster County. The last ten miles of the creek is the boundary line between Lancaster and Dauphin Counties, and it drains the northern slope of the South Mountain Range. It has a watershed of fifty-five square miles very largely in Lebanon County, of rolling farm land under high cultivation. The railroad parallels the creek from the head waters to within four miles of the river where it connects with the main line of the Pennsylvania Railroad at Conewago Station. There is not a borough on the watershed, the largest village is Lawn, perhaps two hundred population. It is four miles below Mt. Gretna. The total population in the valley is estimated to be about one thousand, exclusive of Mt. Gretna. The farmers are mostly of the Dunkard sect, noted for thrift and cleanliness.

Every estate of the entire Conewago watershed has been inspected, the outside of the Mt. Gretna settlement there were found to be but five nuisances. Three of them are in the village of Lawn, South Londonderry Township, Lebanon County, and the other two in Dauphin County. One is that of Aaron Herr, Conewago Township, consisting of a privy on the bank of the creek, and the other that of Tobias Hoffer, Londonderry Township consisting of an overflowing privy, seventy-five feet from the creek. Waste water and slops are carried by pipe leading from pump trough, thence under public road to a ditch passing within a few feet of a Mr. Goss's dug well.

At Lawn, Mr. David Flory owns a slaughter house on the banks of the creek from which drainage is directly into the stream through a six inch sewer. A four inch pipe from the house conveys drainage from a water closet and from the kitchen to the creek. Mr. Longenacker, proprietor of the hotel at Lawn, discharges kitchen and bar-room wastes through a box drain into the highway gutter and thence in the highway in front of several properties, finally to the creek. The yard about the barn, pig-pen and privy is not well kept. These are about 300 feet from the creek. Mr. Joseph Stevens has a three inch sewer pipe from his house to the highway at Lawn. It receives kitchen wastes and wash water. Notices to abate have been served on these owners.

The Conewago Creek courses through or by pasturage land. The stream appears to be clear and suitable for cattle to drink. Nowhere along its course is the water used by human beings. At Mt.

Vernon Station, about one mile above Conewago Station, water is pumped from a tributary into a tank and thus supplied to locomotive boilers. At the head waters of this tributary is a fertilizer plant which in times past has polluted the run and been the occasion for litigation. The Department issued orders for abatement and at present drainage from this plant is being conducted to cesspools. It is reported that sickness among some of the railroad employes was attributed to the use of the locomotive water for drinking, which water had been polluted by drainage from the fertilizing plant.

The creek should be preserved in its purity. There are numbers of places where privies are full and over-flowing but their location is back several hundred feet from any run or stream and the inspectors have therefore, been cautious about reporting such privies as nuisances.

Not all of the sources of drinking water in the entire watershed were examined. Below Beverly village, which is four miles down stream from Lawn, springs and wells are not used generally by individuals visiting at the Mt. Gretna camp settlement. Probably the militia roam about most. The military manoeuvers never extend below Beverly. On the watershed above this point there are 38 springs, 75 dug wells, 23 drilled wells and 7 cisterns, furnishing water for drinking purposes. A sample has been taken from each one of these sources, properly tagged and sealed in the regulation bottle used by the Department in this work, packed in ice and shipped to the State Health Laboratories for bacteriological examination. These samples have been tested for the total bacterial count and for colon.

Of these 143 sources, 19 were found to contain colon. Twelve of the 19 samples were from dug wells, three from drilled wells, one from a cistern and three from springs. Two of the springs were within the limits of the Mt. Gretna settlement, the other seventeen samples showing colon were distributed as follows:

At Beverly, 1 cistern, sample No. 29.

Between Beverly and Bellaire, 4 dug wells, samples Nos. 17, 18, 32 and 112.

Between Bellaire and Lawn, 2 dug wells, samples Nos. 98 and 180. 1 drilled well, sample No. 102.

At Lawn, 5 dug wells, samples Nos. 41, 78, 79, 84 and 92. 2 drilled wells, samples Nos. 40 and 65. 1 spring, sample No. 70.

Between Lawn and Colebrook, 1 dug well, sample No. 36.

Sample No. 29 was taken from a cistern on the property of B. L. Geyer, in the village of Beverly, Conewago Township, Dauphin County, Post Office Address, Elizabethtown R. F. D. No. 4. Water said to be used only for washing. There are two dug wells on the premises.

With respect to the wells between Beverly and Bellaire—Sample No. 17 was taken from an old well on the property of L. H. Kyler, Mt. Joy Township, Lancaster County. Water from this well has not been used during the past year. A spring furnished the supply.

Sample No. 18 was taken from a dug well on the property of Eli Brandt, Mt. Joy Township, Lancaster County. Address Elizabethtown, R. F. D. No. 4. There is also an old well and a spring in the

barnyard on this property. The dug well is 20 feet from the water course that drains the barn-yard. Indirect connection with the well may be the cause of pollution.

Sample No. 32 was taken from a dug well on the property of Mrs. Isaac Kylor, Conewago Township, Dauphin County, address Elizabethtown, R. F. D. No. 4. The well is about 150 feet from the privy. Surface drainage is the supposed means of contamination.

Sample 112 was taken from a dug well on the property of J. W. Shissler, Conewago Township, Dauphin County. There is a small puddle six feet from the well which may cause surface pollution by drainage into the well.

With respect to the wells between Bellaire and Lawn—Sample No. 98 was taken from a dug well on the property of Sam H. Risser, South Londonderry Township, Lebanon County, address Lawn, Pa. The well is housed over and water from the roof is conducted to the well. It is in the barn-yard, surface drainage being away from the well. A small manure pile is distant fifty feet. There is also a dug well at the house.

Sample No. 180 was taken from a dug well on the property of A. G. Cable, Conewago Township, Dauphin County, address Elizabethtown, R. F. D. No. 2. Slops and waste water from the house drains to the surface of the ground at a point about six feet from the well.

Sample No. 102 was taken from a drilled well on the property of J. S. Risser, South Londonderry Township, Lebanon County, address Palmyra, R. F. D. No. 2. The contamination may be from the surface, for wash water and slops are emptied onto the ground twenty feet distant.

With respect to the wells and springs at Lawn—Sample No. 41 was taken from a dug well on the property of Ben Kopp, South Londonderry Township, Lebanon County. The well is 25 feet from the house and a small pool in which ducks waddle is at the edge of the well and may drain into it.

Sample No. 78 was taken from a dug well on the property of Jacob M. Hostetter, South Londonderry Township, Lebanon County. The well is about ten feet from the house. Water not often used.

Sample No. 79 was taken from a dug well on the property of John Brennan, South Londonderry Township, Lebanon County. This well is about 30 feet deep, on the hillside, ten feet from the house and between the house and the privy higher up on the hillside and about 150 feet away. This privy is a surface closet and wash water drains toward the well. Large numbers of colon were found in this water.

Sample No. 84 was taken from a dug well on the property of John K. Meyers, South Londonderry Township, Lebanon County. The well is located in the house, is walled up above the surface of the ground, and the surface slop from the stable located 200 feet distant is away from the well.

Sample No. 92 was taken from a dug well on the property of Isaac Risser, South Londonderry Township, Lebanon County, about one mile west from the Lawn station. On this property there are two dug wells and a spring. The spring is about 100 feet from the

house, between the house and the barn. There is also a dug well at the house. The sample taken from these did not show pollution. The dug well at the barn is located 60 feet from the highway at the corner of the barn and in the barn-yard. It is dug to a depth of about 20 feet. The manure pile is about 60 feet distant. The surface of the ground slopes away from the well. On September 8th, 1906, Irvan B. Risser, 30 years of age, had typhoid fever, and died.

Sample No. 40 was taken from a drilled well on the property of Stauffer and Bruebaker, at Lawn. The well is drilled 60 feet deep and is at the grist mill. It is not used for drinking purposes.

Sample No. 65 was taken from a drilled well on the property of Joseph Wolgemuth, South Londonderry Township, Lebanon County. There is a dug well on the premises whose waters tested all right. The drilled well is in the barn-yard near the manure pile. Its contamination from the surface is probable.

Sample No. 70 was taken from a spring on the property of J. H. Reed. The spring is situated in a field near Lawn Station. It is used for drinking water. Cattle are pastured here, and the spring is unprotected. The old dug well on the property does not show contamination by the test.

With respect to the well above Lawn and below Colebrook—Sample No. 36 was taken from a dug well on the property of Christ Gingrich, South Londonderry Township, Lebanon County, address Lawn, Pa. The well is 20 feet from the stable. There is also a spring on the property about 200 feet from the house. The well was condemned by a U. S. Army officer during the summer of 1906.

BACTERIOLOGICAL TESTS OF DRINKING WATER FOUND TO CONTAIN COLON, MADE BY STATE, JUNE, 1907.

No. of sample.	Class.	Total No. of B. per C. C.	Colon per C.
29	Cistern,	2,400	3
17	Old dug well,	22,000	66
18	Dug well,	5,400	110
32	Dug well,	1,800	10
112	Dug well,	496	10
98	Dug well,	1,800	3
180	Dug well,	3,000	70
102	Drilled well,	1,800	20
41	Dug well,	2,800	3
78	Dug well,	3,000	8
79	Dug well,	2,000	100
84	Dug well,	280	1
92	Dug well,	350	6
65	Drilled well,	210	1
70	Spring,	4,000	20
36	Dug well,	1,500	4
40	Drilled well,	3,000	5

Notices have been posted on the properties at the wells or springs found by the tests to be contaminated. The notices were printed upon cloth and are those approved by the Commissioner for general use in the Department. They read—

"Commonwealth of Pennsylvania.

HEALTH PRECAUTION.

Do not drink the water from this well.

SAMUEL G. DIXON,
Commissioner of Health."

The word spring or stream or tank is substituted in place of well when necessary.

There were nine cases of typhoid fever and two deaths in the valley below Mt. Gretna during 1906. One case was that of Anne Longenecker, sick during November at the hotel at Lawn. A nuisance on this property has been ordered abated. Irvan B. Risser, died September 8th, at his home at Lawn. The well here has been condemned and recently posted. There were six cases and one death in the family of Amos Barnhart in March, 1906. The house is in Newville village, West Donegal Township, Lancaster County. Drainage there from is to the stream passing a ferilizer plant and supplying water to the C. & L. Railroad tank at Mt. Vernon Station. Tests of the tank water collected June 6th, 1907, (Sample No. 100) showed a total bacterial count of 280 only, no colon. A warning sign has been placed on this tank. The privy vault on the Barnhart property has been cleaned out and thoroughly disinfected under the direction of a Department inspector. Today one case only exists. It is at the residence of T. W. Goss, near the river. Notice for the abatement of a nuisance was served on Tobias Hoffer, from whose farm pollution reaches the Goss well.

By reason of the natural advantages, Mt. Gretna has become a resort of some renown. The mobilization of the National Guard of Pennsylvania at this point in May, 1898, on the call of the President for troops for the Spanish War, has given the place historic fame. The locality is also utilized for permanent summer camps, and many permanent summer cottages have been erected on the grounds. The Cornwall and Lebanon Railroad has ample facilities at Mt. Gretna Station for the accommodation of excursion trains.

The topography consists of rolling country mostly wooded except the portion used for military purposes. There are several hills or peaks elevated from four to five hundred feet above the valley forming the foothills of the South Mountain Range. The whole district is underlaid with red sandstone, while the surface portion, where the land has been cleared in the valley, is of a light sandy porous soil. The woodland portions, however, are covered with a rich, black organic soil. The territory is well watered by numerous mountain streams and springs. Some of the latter are said to possess medicinal properties.

On the Conewago Creek there is an artificial lake, about 20 acres in area with a maximum depth of 15 feet. It affords boating, bathing and fishing. In the winter months ice is taken from the lake

and stored in a building below the dam. This house is said to have a capacity of about twenty thousand tons. On a tributary below the encampment grounds there is a second pond from which ice is harvested and stored in an adjacent building. The pond is small. These ice privileges are owned by the United Ice and Coal Company, Harrisburg. Mt. Gretna obtains its ice supply from this Company through a local dealer.

The dominant landed interests are vested in the Coleman Estate. Several thousand acres are said to be involved. These interests have voluntarily established a military reservation of about 1,500 acres in extent and a general picnic ground of possibly 500 acres in extent, including the mountain side pathways. The latter is said to have been established in 1884 and the former in 1885. Both are maintained at the will and by sufferance of the said Coleman Estate, its heirs or assigns, immediately represented by Mr. A. D. Smith, President and General Manager of the Cornwall and Lebanon Railroad.

For many years the State maintained a rifle range at Mt. Gretna upon land owned by the Coleman Estate. In July, 1901, the range comprising an area of 241 acres was purchased by the State, together with a right of way extending northeasterly along the southern shore of the lake and creek and by the Chautauqua ground to the camp-meeting grove and thence across the creek to Mt. Gretna Station. The grantors reserved a 50 foot right of way for the tracks of the branch of the Cornwall and Lebanon Railroad extending to the ice house below the dam at the lake, and also a 30 foot right of way for the narrow gauge pleasure railroad connected with the picnic grounds and also all water and other pipes on the rifle range.

It is reported that about 1892 the Mt. Gretna Camp Meeting Association was founded under the auspices of the East Pennsylvania Conference of the Church of the United Brethren. The Association has purchased and now owns 33 acres of land.

It is also reported that in 1892 the Pennsylvania Chautauqua Association of Mt. Gretna founded a summer school and assembly. At present the grounds comprise about 92 acres.

About three-quarters of a mile above Cole brook the Conewago Creek makes a sharp turn to the east, leaving the Cornwall and Lebanon Railroad which follows up the valley of a tributary on which is the small ice pond hereinbefore mentioned. This tributary for convenience is termed the North Branch. Between it and the main stream is the railroad, some open fields used for military encampments and sloping either to the North Branch or the main stream and a hill rising more than a hundred feet above the valleys of both streams. Mt. Gretna Station is at the upper or northeast corner of these fields and north of it and the railroad; the land is wooded heavily and rises rapidly into the hills whose summits are three hundred feet or more in heighth. The North Branch has its rise in springs which are north and west of Mt. Gretna Station. The main stream, however, which is south of and 1,200 feet distant from the station continues in a northeasterly direction for about a mile to the summit.

The rifle range is south of the main creek opposite the military field.

Lake Conewago is east of the range, between it and Mt. Gretna Station. The Chautauqua grounds overlook the lake and are on the hillside from the lake and the creek southerly. The easterly boundary of these grounds is a road which forms the westerly boundary of the camp meeting ground previously mentioned and extends northerly to the station. The general picnic grounds, made especially prominent by the annual meeting of various associations, lies between the railroad and the creek and east of the road leading to the station. Immediately west of this road and between the railroad and the creek and the lake is the parade ground.

State Rifle Range.

On the rifle range picked men from each regiment of the National Guard are assembled for rifle practice for a week or ten days annually. In all there are about 150 men encamped on the grounds at such times. Permanent barracks have been constructed at the western end of the range. The rifle butts are located towards the eastern end of the range. On high ground three quarters of a mile to the east of the range there is a spring on the property of Grant Fisher, from which a stream extends westerly to and through the east end of the range to the Conewago Creek below the ice house and the lake. This water course drains most of the State's property, but the ground in the vicinity of the barracks and where the privy vaults are located, slopes towards the main creek.

The water supply is obtained from an open walled spring located on the hill south of the range in a clump of trees. The water is pumped into a concrete lined reservoir, rectangular, built in the ground and housed over, located on the highest point of the hill. From here a 2 inch pipe delivers the water by gravity to the barracks and other places on the ground. The hill is covered with underbrush and small trees, and there is no source of contamination there. Any pollution would have to be accidental or malicious. The spring is unprotected. Access to it is intentionally afforded.

In the eastern part of the range near the road entrance and near one of the rifle butts, there is a small walled spring hidden in the grass near the run and not much higher. It is used for drinking water by woodsmen and campers.

BACTERIOLOGICAL TESTS OF WATERS AT RIFLE RANGE.

	No. of sample.	Date of collection.	Total No. of Bac. c. c.	Colon per c. c.
Spring on hill,	124	June 4	2,400	16
Spring on hill,	250	June 20	120	00
Spring in valley,	127	June 2	30	0
Spring in valley,	251	June 20	420	0
Run when it leaves range,	252	June 20	560	10
Run when it enters range,	126	June 4	11,000	70
Grant Fisher's spring,	125	June 4	3,000	20

The Fisher Spring is so located in the field below the house and barn that the surface drainage from these buildings may easily cause pollution. In the field cows are pastured, the ground is swampy and this is believed to account for the colon found in the waters of the spring and the creek or run.

It will be noted that the spring on Fisher's Hill named Stewart spring, the first test showed colon which were absent on the second test. The presence of colon in the first sample is difficult to explain. There is no known source of contamination. The spring should be cleaned out and fenced in. The second sample stood the test which should be expected of it and proves the first contamination to have been transitory. It may have been caused by a wild animal.

The customary warning signs have been placed at the Fisher Spring and along the line.

Chautauqua Assembly Grounds.

The management of the Pennsylvania Chautauqua Association is in the hands of a board of managers. C. Shenk, Esq., of Lebanon, Pa., is president. The corporation owns the grounds, the important buildings and some of the cottages. There are about 92 of the latter buildings and they are arranged in tiers around the amphitheatre opening down upon the lake and parade ground. Some of the cottages have been built and are owned by private individuals. Others may be purchased or rented. The Association operates a system of water works and sewerage works. The grounds are very well kept. The auditorium has a seating capacity of 2,000. The annual assembly opens in July and continues into August. During this term there is a resident population of upwards of 1,500 persons. Transient visitors may be accommodated at Mt. Gretna Inn or Woodcliff Hall, both within the enclosure.

The water supply is obtained from a spring at the foot of a hill below the cottages and near Conewago Lake. The spring is walled up and open as is one other spring similarly located at the resort. From the first, called "Medicinal Spring," which is in the western part of the grounds near the right of way leading from the State Rifle Range to Mt. Gretna Station, water is supplied by gravity to a nearby masonry reservoir about 25 feet square and 4 feet deep, housed over and used as a pump well. The pump house is located nearby and over 100 feet from the shores of Conewago Lake. There is a 2½ inch suction pipe from the pump to the Lake and to the reservoir. It is reported that when the spring supply is insufficient, the lake water is furnished to make up the deficiency. This usually occurs during the latter part of the summer months when the population in the grounds and vicinity is greatest, and the bathing in the lake at its maximum. The intake is at the upper part of the lake, the bathing houses are near the dam and on the opposite shore. It is further reported that the cottagers are always notified when the lake supply is used. From the pump house the water is raised against a head of about 100 feet to a 20,000 gallon cedar tank located on the hillside behind the cottages. From this tank the distribution is by gravity throughout the grounds.

The Inn has its own supply of ground waters, obtained from the premises by pump.

The sewerage system for the grounds was laid out in 1898. At present is consists of about 1,700 feet of 4 inch pipe, 2,200 feet of 6 inch pipe and 3,900 feet of 8 inch pipe. The system was approved in 1900 by the State Board of Health. So also were plans for sewage purification works, and the Association was urged to complete such plans with the least possible delay.

It is reported that all the cottages are connected with the sewers. The deed of transfer from the corporation requires property owners to pay a proportionate part of the cost of sanitary improvements. Cottage owners and visitors are not permitted to deposit slops, wash water, drainage or refuse of any sort on the grounds. House drains and waste pipes are not permitted unless connected with the sewer.

The outfall is 8 inches in diameter, follows the shore of the lake on the hillside above the lake, passes under the creek below the dam and thence along the north bank of the creek to the disposal plant which is located 250 feet below the ice house and about 2,000 feet below Medicinal Spring. The site is secluded, in a narrow ravine at the foot of the hill to the north on whose summit the headquarters of the commanding officer of the encampment is usually located, and at a point about a quarter of a mile above where Fisher Run passing through the Rifle Range enters the creek. On either side of the stream at and below the plant, there is marshy ground.

The disposal works, according to the plans approved in 1900, were to consist of four coke breeze strainers and two sand filters. The latter were to be 47 feet long and 32 feet wide each, or a total area equivalent to about one-fifteenth of an acre. At a rate of 100,000 gallons daily per acre, known to be a safe maximum for contrated sewage, the sand filters would be capable of purifying about 7,000 gallons each 24 hours. However, only two of the strainers and one filter bed were constructed. At present the plant consists of a small oblong inlet chamber built of masonry and provided with vertical screens from which the sewage flows to two coke strainers. These are open concrete structures each 15 feet by 13 feet, containing coke breeze to a depth of 18 inches. The inlet to each strainer is a 6 inch pipe located in one corner, and at the opposite corner of the same end of the compartment is the outlet 6 inch pipe. The intention was that the sewage should fill the strainers, but no means is provided to effect this filling, and, in consequence, the sewage passes directly across the end of the strainer in a course made by the flow, and thus escapes in practically an unstrained condition to the sand filter. At the time of the inspection in June there was no surface indication of the presence of a filter. There was a sewage pool stagnant and filthy, about 15 feet wide and 30 feet long, the surface of the liquid in the pool being about four feet below the strainers and about the same height above the creek. This pool is formed by embankments on three sides evidently made to hold the sand. Whether sand formed the bottom of the pool was not ascertained because of the depth of the sewage and the heavy scum on the surface of the liquid. A small pipe near the surface of the embankment afforded means of outflow of the sewage and determined the level of the pool. Sewage also seeped through the enbankment underneath this pipe into a ditch leading to the creek.

The plant is totally inadequate in capacity to successfully treat the sewage delivered to it, even were it efficiently operated and maintained.

On June 4th, 1907, the Chautauqua Association was notified by the Commissioner of Health that the State Department purposed to bring about the maintenance of high standards of sanitation at Mt. Gretna and in the valley of the Conewago, and since the sewage from the Chautauqua grounds is now discharged practically untreated into the creek, the necessity for providing adequate facilities for the proper treatment of the sewage was urgent. Prompt action was requested and an application blank for State Approval of alterations and extensions to the plant, was forwarded to the corporation. On June 26th the Department was informed that improvements and additions to the plant would be carried out as rapidly as possible under State approval. On June 26th, no plans having been filled in the meantime, the following letter was written:

Harrisburg, Pa., June 26, 1907.

Pennsylvania Chautauqua Association,
C. Shenk, President,
Lebanon, Penna.

Gentlemen:—

Crude sewage is being discharged into Conewago Creek, Lebanon County, from the sewerage system and sewage disposal works owned and operated by your Association. The plans for a sewage purification plant, approved in 1900 by the Pennsylvania State Board of Health were not adhered to and the plant as constructed has been negligently operated. Today it is totally inadequate to satisfactorily deal with the sewage from the Chautauqua grounds. Human life is imperiled on this account, and the interests of the public health demand prompt action. Under the laws I have determined that sewage must cease to be discharged into the Conewago Creek or its tributaries, and to this end, beg to notify you of the willingness of my Department to co-operate and advise with you relative to the matter. Great advancement has been made in the art of treating sewage during the last few years, and the plans for alterations and extensions to your sewage disposal plant should comprehend this advancement, and such plans, together with adequate information as to existing conditions and the amount of sewage to be treated, must be submitted to the State Department of Health for consideration and approval on or before July 15, 1907.

Yours truly,
SAMUEL G. DIXON,
Commissioner of Health.

Should the main sewer leak, pollution would reach the lake and the creek but not the springs on the Chautauqua grounds with one exception. At the medicinal spring pump well the sewer is imbedded in the wall at the top of the reservoir or well, and is higher than the level of the water in it. The imbedded pipe is cast-iron. If for any reason the joints in the sewer at or near the reservoir should become loosened, pollution of the water in the reservoir would be possible. The proximity of the sewer is a menace to the public water supply of the Association grounds.

All garbage is collected and taken to an incinerating plant located just below the sewage disposal plant.

There is only one privy on the grounds. It is located on a hill in the southwest corner and is used by workmen.

BACTERIOLOGICAL TESTS OF WATERS AT CHAUTAUQUA GROUNDS AND INN, CONEWAGO CREEK.

Drinking Water.	No. of sample.	Date of collection.	Total Bac. per c. c.	Colon per c. c.
Chautauqua grounds medicinal spring,	129	June 4	9	0
Pump at inn,	130	June 4	140	0
Tap on grounds,	131	June 4	300	0
Conewago creek at Kauffman's grocery store,	133	June 4	2,000	0
Conewago lake at dam,	128	June 4	210	0
Below sewage plant,	253	June 20	200,000	250
At Colebrook,	8	May 28	1,300	0
Between Colebrook and lawn,	38	May 29	22	0
Below lawn,	43	May 29	1,200	2

Under the auspices of the United States Army, Mineral Spring water was tested bacteriologically on July 23rd, 1906, and found objectionable with doubt, and a sample of the water was collected on July 26th, and found to be all right by chemical test.

In the interpretation of the bacteriological tests above given, which show the lake water to be contaminated, also the creek between Colebrook and Lawn, as well as the springs in the Chautauqua grounds, the important fact should not be overlooked that the topographical evidence is wholly and most postively prohibitive of the conclusion that the creek water below the sewage disposal plant is safe for use by man or beast.

At the time of sampling about 15 families only were using the sewers. A mere dribble was passing on to the strainers. This is evidenced by the tests of the creek water collected immediately below the sewage works. The lake showed 210 bacteria and the creek below the works 200,000 bacteria, but below Colebrook 22 bacteria only. Had the samples been collected two months later when the sewage of several thousand people is discharged into the creek, evidences of this pollution could have been traced to the mouth of the creek. The stream during the summer months is an open sewer. Because the amount of sewage pollution at present is small and in consequence the natural purifiying agencies are favored, it does not follow that even under these circumstances the creek water is safe for man or beast. To the contrary it is positively known that the dejectea of one individual, though unseen, may be transmitted many miles in running water and poison those who drink such water. The Conewago Creek below the sewage disposal plant is not suitable for drinking nor even for the meaner domestic uses.

The lake water should never be used as a source of supply, the pump suction to the lake should be disconnected and the auxiliary supply obtained either from the other springs on the ground or

from some approved source. The main sewer line should be changed and placed at a proper distance away from the pump house reservoir, plans of the existing water works should be filed with the State Department of Health and all extensions and improvements to the sewer system and disposal should be made in compliance with plans formerly approved by the Commissioner of Health and filed in his Department according to law. In compliance with these suggestions the Commissioner of Health forwarded a communication to the Association, the following being a copy thereof, dated Harrisburg, June 28, 1907:

Pennsylvania Chautauqua Association,
C. Shenk, President,
Lebanon, Pa.

Gentlemen:—

In the interests of the general public health and to the end that public confidence in the healthfulness of Mt. Gretna Park as a health resort shall again be restored the State Department of Health has instituted investigations and is taking such action as the case demands. A sanitary survey has recently been made of the properties of your corporation and those of others, and individuals in the Conewago valley, and tests of the water supply therein have been made. Relative to your property, I beg to advise that the Conewago Lake water should never be used as a source of public supply and the pump suction pipe to the lake now existing on your grounds should be disconnected and the auxiliary supply obtained either from the other springs on the ground or from some approved source. The main sewer line should be changed and placed at a proper distance away from your pump house reservoir. Plans of your existing water works should be filed with the State Department of Health at once, and all extensions and improvements to the sewers and water works should be made, in compliance with plans to be submitted to and formally approved by the Commissioner of Health.

SAMUEL G. DIXON,
Commissioner of Health.

Camp Meeting Grounds.

The management of the Mt. Gretna Camp Meeting Association is in the hands of a Board of Directors, Major H. P. Moyer of Lebanon, Pa., President. The grounds are bounded on the east by a small run which rises in the hills south of the camp. There is no natural water course within the grounds. Some 200 cottages have been erected principally by private individuals who have purchased lots of the management. A few families reside in the village all the year. Most of the cottagers come for the summer months only. There is a summer population of possibly 1,500 people. The maximum is reached during the conference in August. The Association has provided a sewer system which was built in 1906 and a water works. An open air auditorium seating 1,200 is the most conspicuous building. Many of the cottages are closely packed together but withal, present a neat appearance. About 100 cottages are connected with the sewer system. The remainder are provided with interior dry closets, but there are three public privies on the ground.

The sewers range in size from 4 inches to 8 inches in diameter, and extend throughout the cottage district approximately about 15 acres. About three-quarters of a mile of sewers have been laid and the main connects with and discharges into the sewer system of the Chautauqua Association. The latter corporation makes a charge for each cottage and buildings connected to the Camp Meeting sewers.

Two of the public privies are connected with the sewer. The vaults are dry, masonry walls are carried up on the sides to about flush with the ground and no means is provided for flushing the accumulations into the sewer. It is reported that only at long intervals are the vaults partially emptied and that then the contents pass down into the sewer in masses and tend to clog the structure in the Chautauqua ground where the grades are flatter. It is also reported that clogging has occurred at or near the pump house reservoir on the Chautauqua grounds. The third public privy is in a dilapidated condition. It is located in the upper part of the camp near the run and no precaution seems to have been taken to prevent surface drainage from washing more or less of the contents of the vault which is a mere hole dug in the ground out into the water course, and thence by the stream into the creek and Conewago Lake. In the rear of this privy is a dumping ground for dry rubbish and it is reported that garbage is deposited here at times. General offal of the camp is collected early in mornings and removed in scavenger wagons. Excrement and slops from cottages not connected with the sewer is supposed to me deposited in the public vaults connected with the sewer.

There is a wash house, not a steam laundry, rather dilapidated and located within fifty feet of the run near where it joins the creek on the camp ground. The dirty water drains to the stream. People also wash clothes in the run. All of this contamination reaches the lake and hence pollutes the water which sometimes is pumped out of the lake at the Chautauqua grounds. The laundry should be connected with the sewer, or entirely abandoned.

The Association obtains most of its water supply from a drilled well located high up on the hills in the grounds beyond the cottages. It is said to be sunk to a depth of 160 feet which brings the bottom about level with the Conewago Creek. The water is raised by a gasoline pump into a concrete reservoir beside the well, circular in form, roofed over and having a capacity of about 30,000 gallons. From the reservoir the water is distributed by gravity throughout the grounds. Tests of the water prove it to be all right. At points throughout the camp, there are numerous hydrants projecting above the surface of the ground intended for the use of the public. It is known that in times past, inhabitants of the camp ground after emptying faeces and chamber lye into the public privy vaults mornings, would rinse the pails at the spigot or hydrant located outside the closet, and throw the rinsings onto the ground where it caused a nuisance and might drain to the streams. This custom is physically possible now. Either all buildings should be connected with the sewer or a sanitary patrol is essential to keep the camp in a satisfactory and sanitary condition. Garbage disposal alone calls for vigilant supervision on the part of the management. The present water pipe system is about one mile in length, the pipe sizes rang-

ing from one to two and a half inches in diameter. The Association does not have a charter for water purposes, so far as the Department is informed. Reasonable water rates are charged to the cottagers.

The Association obtains a part of its source of supply by purchase from the management of the picnic and military grounds. There is a stream north of the station in West Cornwall Township, coming down from the mountain sides through the picnic grounds and passing a quarry and brick yard to the Conewago Creek. At a point on this stream, approximately half a mile from the station, there is a small wooden dam banked with earth which forms a basin holding about 20,000 gallons. The surface of the water is said to be 130 feet above the Conewago Creek. The watershed is thickly wooded, precipitous and narrow and pathways up and down the gorge form the picnic grounds are frequented by visitors. The springs at the sources of the stream are sheltered and delightful spots for basket parties. Any accidental pollution on the drainage area to the dam of pathogenic character might readily be distributed in the water pipe system and cause disaster. From the reservoir which is inclosed by a barbed wire fence, water is delivered by gravity through a 3 inch iron pipe to the picnic grounds, camp meeting grounds and the military reservation. It is the intention of the Camp Meeting Association to discontinue the use of this source of supply as soon as the artesian well supply of its own is in good running order. So far as it is known the only reason for furnishing the gravity supply in the past has been the inadequacy of the pumps to deliver enough deep well water. Within a year a new pumping engine has been installed at the well and it is expected that it will prove adequate.

Distributed at different points in the camp are four public hand pumps which are generally in use. Many of the cottagers get their water from these pumps. Three of them are located in the low part of the camp below the cottages, and the fourth on the hill surrounded by cottages. It is a drilled well and within 5 feet of it there is a cottage sewer and within 15 feet a main sewer. These figures are approximate.

The three pumps in the low ground rest on wooden platforms supported by walls enclosing springs, which were formerly opened. They are covered to prevent pollution. There is nothing to prevent any contaminating matter tracked onto the platform by footwear from being washed down through any cracks there into the spring. One of the springs is 25 feet or so from the camp ground run, which is liable to pollution by the privy vaults hereinbefore mentioned. The spring is about level with the run. It is physically possible for the spring water to be contaminated by the run. Absolute safety would warrant the abandonment of this spring.

BACTERIOLOGICAL TESTS OF DRINKING WATERS AT CAMP MEETING GROUNDS.

	No. of sample.	Date of collection.	Total Bac. per c. c.	Colon per c. c.
Public water works, 160-foot well,	140	June 4	200	0
Public hand pumps, pump on hill,	139	June 4	6	0
Pump at spring near run,	138	June 4	140	0
Pump near Springside cottage,	134	June 4	120	0
Pump near Rudy's cottage,	135	June 4	1,800	0

While the tests are very satisfactory, not one of the sources, with the exception of the 160 foot well is sufficiently protected to render the waters free from suspicion during the season when the cottages are occupied.

The walls about the springs should be carried up high above the surface of the ground and be made water tight to keep out all surface drainage and the platforms over the springs should also be of water tight construction. Preferably the pump and spring at the run should be abandoned.

The sewers should be well re-located as far away from the pump and drilled well on the hill at the cottages as may be found practicable and the pipe joints should be made tight.

Weekly inspections of the sewers should be made and all stoppages promptly removed. The best way of keeping the ground along the pipes free from sewage saturation is to maintain a free flow in the sewers. This precaution is important because the springs on the low ground are menaced by the main sewer (which passes above them in the vicinity), provided the sewer joints are not tight. Plans of the sewer system and the water works should be filed with the State Department of Health.

All privy vaults should be made absolutely water-tight and either used as dry closets without connection with the sewer, or the vaults should be re-constructed and be provided with troughs, frequently flushed automatically by tanks holding a sufficient volume of water to readily remove all matter to the sewer and in the sewer to the disposal works.

The troughs should be frequently disinfected and the doors should be properly screened.

If the vaults are to be used dry then the walls should be carried up above the surface of the ground to keep out surface drainage, lime or some other disinfectant should be frequently and abundantly used, and the entire contents should be removed before the receptacle becomes filled and deposited at some remote place in a hole dug in the ground for the purpose, in accordance with the best sanitary practice.

If practicable, compulsory connection of all buildings with the sewers should be enforced. Especially is this applicable to the laundry. The management should prohibit all washing in the run

or creek and the discharge of wash water, slops and rinsings, on the grounds or anywhere, except into the sewers or other proper receptacles, provided for the purpose.

Garbage should be collected daily and incinerated and the Association should maintain a sanitary patrol of the ground. Frequent disinfection of receptacles for offal should be the rule.

Safety demands that all water supplied from the dam and used for drinking or culinary purposes should be boiled. The following is a copy of a letter sent to the Association relative to these matters.

"Harrisburg, Pa., June 28, 1907.

Mt. Gretna Camp Meeting Association,
Maj. H. P. Moyer, President,
Lebanon, Pa.

Gentlemen:—

The grounds of your Association located on the Conewago Creek in West Cornwall Township, Lebanon County, Pa., is one part of several properties which unite to form the public resort widely known and until recently favorably known as Mt. Gretna.

Nature has favored this spot and its natural resources and healthfulness should be preserved. To the end that confidence shall again be restored, the State Department of Health has been requested to make investigations and to take such action as the case may demand in the general interests of the public health. While it is pleasing to observe no widespread fatalities or sickness is known to have been attributed to the unsanitary conditions alleged to exist at Mt. Gretna, nevertheless, publicity of such alleged conditions has not been without results.

A sanitary survey has been made by the Department of your grounds and those of other corporations and individuals in the Conewago valley. Tests of the water supply have been made and uses of wells, springs, streams and lakes noted.

Relative to your property, I beg to offer advice and co-operation respecting certain important changes necessary to safeguard public health.

It appears that your public water supply is good in so far as it may be derived from the deep well. The water from the dam is liable to dangerous pollution and your intention to abandon its use is commendable. You are advised and requested to notify the public on your grounds whenever water is supplied from the dam and to advise the boiling of all such water used for domestic purposes.

The springs and pumps are dangerous. The water stands a good test now but its quality is menaced. The walls about the springs should be carried up high above the surface of the ground and be made water tight to keep out all surface drainage and the platforms over the springs should also be of water tight construction. Preferably, the pump and spring at the run should be abandoned. The sewer should be replaced as far away from the pump and drilled well on the hill at the cottages as may be found practicable and the pipe joints should be made tight. Weekly inspection of the sewers should be made and all stoppages promptly removed. The best way of keeping the ground along the pipes free from sewage saturation is to maintain a free flow in the sewer. This precaution

is important because the springs on the low ground are menaced by the main sewer (which passes above them in the vicinity), provided the sewer joints are not tight.

Your attention is called to the law requiring all private corporations to file plans of sewer systems and water works systems and you are requested to do this at an early date.

Garbage and refuse disposal is not sufficiently looked after. Privy vaults are in a dangerous position or unsanitary condition and pollutions of the run and lake water result. The water from the laundry house flows over the surface of the ground and reaches the lake. This body of water is used for the harvesting of ice in winter. The ice is sold to the public at Harrisburg and elsewhere. It is also reported that a local dealer supplies it to your grounds. These conditions invite serious consequences. There are practical remedies. I respectfully request and suggest that all privy vaults be made absolutely water tight and either used as dry closets without connection with the sewer, or the vaults should be reconstructed and be provided with troughs, frequently flushed automatically by tanks holding a sufficient volume of water to readily remove all matters to the sewer and in the sewer to the disposal works. Regular water closets would prove extremely satisfactory and probably require less attention. If the vaults are to be used dry, then the walls should be carried up above the surface of the ground to keep out surface drainage, a disinfectant should be frequently and abundantly used and the entire contents should be removed before the receptacle become filled and should be disposed in some remote place in a hole dug in the ground for the purpose or in accordance with some other approved sanitary practice. Doors to all vaults should be properly screened.

The drainage from the laundry house must be conducted to the sewer or the buildings be so located that it may be possible. If practicable, compulsory connection of all buildings should be enforced.

You are requested to prohibit all washing in the run or creek and the discharge of wash water, slops and rinsings on the ground or anywhere within your property, except into the sewers or other proper receptacles provided for the purpose.

You are advised to require the daily collection and incineration of the garbage. You are requested to maintain a sanitary patrol of the camp meeting ground and to enforce the frequent disinfection of the receptacles for offal.

I am assured that it will only be necessary to call your attention to these matters and to offer you my heartiest co-operation. The above suggestions are in line with those made to others at Mt. Gretna.

Yours truly,
SAMUEL G. DIXON,
Commissioner of Health."

General Picnic Grounds.

Mt. Gretna Park is at the station. It is operated under the auspices of the Cornwall and Lebanon Railroad Company. The immediate picnic grounds where the buildings are and the grove

in which the eating tables, restaurant, bowling alley, pavilion and electric light plant are located, comprise an area of about twelve acres. The railroad bounds the grove on the north and Conewago Creek on the south. Just west of the grove is the military parade ground and the baseball field and grandstand. A narrow gauge railway begins at the station, follows down the creek and around the north shore of the lake, crossing below the dam, and extending on to the lower end of the State Rifle Range. Formerly this railway circled among the hills to the summit of Mount Dick. The grove is extensively used during the summer for outing parties which are brought in on excursion trains featured by the C. & L. Railroad Company. By far the great event of the season here is the annual Farmer's encampment of a week's duration late in the summer. The display of agricultural implements and the exposition of manufacturers of farmer's supplies is extensive. On pleasant days more than ten thousand people congregate here. Tents are erected on the parade grounds, also throughout the grove. Picnickers ramble through the woods and seek out retreats in the hills. Many visitors boat upon the lake and bathe in its waters. There is a boating and bathing house on the shores of the lake near the dam by which the narrow gauge railway passes.

The water supply is furnished by springs on the ground and by the water works system. The latter's source is from the dam on the mountain stream to the north which stream comes down through the grove to the creek. The visitors get their drinking water mostly from the springs. The water pipes are also connected with the pipes in the military reservation whose source is from a dam on the north branch of the creek.

In the grove near the buildings there are four springs walled up and open. They are located along the water course and higher than it. The walls are tight, circular, nearly closed and carried up about three feet above the ground. Surface drainage cannot contaminate the waters. The springs flow continually and there is an ample outlet provided, but it could be improved so that one wishing to drink from the spring might avoid getting wet feet. One of the springs is boarded up and has evidently been abandoned. It is in the center of the grove. One of the three springs in use is within one hundred feet of the pavilion; a second is in the eastern part of the grove, and a third is in the western part near the bowling alley between it and the creek.

East of the grove there are three springs accessible to visitors; one is on the public road, the second is Kauffman's spring on the side of the road near Kauffman's residence, and the third is on the hill back of the residence, and the waters are piped from it to the house. These springs are not walled up, so they may be reached by surface drainage.

North of the grove there is a spring in the quarry used by the workmen at the brickyards. A second spring is the source of the stream which supplies the dam from which the supply is obtained for the piping system in the grove. The third is a dug well at Samuel Williamson's residence, higher up on the watershed. The two springs are not protected from surface drainage.

West of the grove and really in the military reservation, there are two springs. One is located back of the boat house at the foot of the hill. It is walled up and open similar to the springs in the grove. The hillsides are covered with brush. In front of the springs the ground is wet and soggy. Below the incinerating plant, which is down stream from the sewage works, ice house and lake, there is a spring hidden in the bushes near the road at the foot of an adjacent hill. This is not walled up nor protected from surface drainage. Opposite this spring is the State Rifle Range, and on Fisher's Run there near where it enters Conewago Creek, and at the spur of the railroad which leads to the ice house, there is a dam by means of which water is diverted into a four inch pipe laid westerly paralleling the railroad to the main line, a distance of about 5,000 feet, and conveyed by gravity to a water tank from which water is drawn into locomotive tenders.

It is reported that railroad employes drink this water believing it to be pure. Tests made by the Department show the water to be contaminated. Tests of the other sources mentioned do not show pollution at the present time, but this is not conclusive in view of known physicial conditions existing during the summer months.

Toilet facilities are totally inadequate to accommodate the large crowds which fill the picnic grounds and the woods and country roundabout during the season. At the grove, so far as the Department is informed, there are two privies only, and no sewers. One of the privies is at the station, and the other is near the electric light plant about 200 feet back from the creek. The buildings are very uncleanly inside, and set over holes dug in the ground. Even this time of the year the odors are strong and objectionable. The arrangements are repellant, and witnesses are numerous to prove that a great number of the visitors are compelled, of necessity, to seek the seclusion of the woods and underbrush for defecation. So the surface of the land sloping to the lake and the creek and tributaries above, is defiled with excrement wherever picnickers may roam, and in consequence surface water anywhere in the district are liable to pathogenic pollution, and are, therefore, unsuitable for domestic purposes, hence the supply to the grove is dangerous and so are the springs into which surface water may flow. The springs in the grove, which is lighted by electricity, are not so liable to be polluted by sewage as the other springs located where excrement is deposited on the ground in the neighborhood or where the drainage may be into the spring wither from the surface or beneath the surface.

The interests of the public health demand that efficient measures shall be adopted to assure a sanitary disposal of sewage. This can be afforded, first, by providing commodious and model lavatories, one for men and one for women, conveniently located. Efficiency and economy would dictate that these buildings should be fitted with modern water closets under the care of an attendant, and that sewers should be provided and all buildings in the grounds connected with the sewers. The outlet should lead to a proper sewage purification plant. The present works by enlargement and remodeling could be made ample to successfully purify the sewage of the picnic grounds, and the sewage from the Chautauqua and Camp Meeting Grounds.

A sanitary patrol is necessary to prevent nuisances being committed in the district. The Ice Company should contribute to this patrol or maintain one itself to preserve the purity of the source of its supply at Conewago Lake and at the lake on the north branch of the creek. Copies of letters sent to the two companies interested relative to these matters, are given below and are self explanatory:

Harrisburg, Pa., June 28, 1907.

Cornwall & Lebanon Railroad Company,
Mr. A. D. Smith, President and General Manager,
Lebanon, Pa.

Gentlemen:—

You are well aware that the written reports of Federal Military Officers relative to sanitary conditions at Mt. Gretna and vicinity have raised fear in the minds of some people as to the healthfulness of the resort.

This has culminated in a searching inquiry by the State Department of Health. You are aware of the nature of this investigation and your co-operation is appreciated. Certain changes in customs and sanitary facilities at the picnic grounds are demanded in the interest of the public health. By attention to them it is believed that not only will public health be safe-guarded but that the superior natural advantages of the resort will be availed of by added numbers in the years to come.

Now, because the privy accommodations are inadequate, crude and uncleanly, and, therefore, naturally abused, neglected and avoided, it is the custom of visitors to seek the seclusion of the woods and underbrush for defecation. In consequence excrement is deposited on the lands near to and sloping toward the lake and creek and any of the surface waters from lands where picnickers may roam are extremely liable to pathogenic pollution. The water supply to the grove is therefore dangerous and so are any springs on the grounds which are unprotected from surface drainage.

Relative to the water supplied to the grove from the dam, or the surface sources, by means of the water works system, all of it used for domestic purposes should be either adequately filtered or boiled. You are requested to see that this is done.

Your attention is called to the fact that your company has failed to comply with the laws of the State requiring the filing of certified copies of plans and surveys of the water works. I hereby request your company to file plans of the water works system owned or operated by it at Mt. Gretna, on or before July 15th, 1907, together with a satisfactory description of the source from which the supply of water is derived. For this purpose I hereby enclose a blank form of report.

Relative to the springs on the ground, the three now open and walled in the grove are not so liable to sewage pollution, because the grove is lighted by electricity and these springs are protected from surface wash, but other springs located in the neighborhood where excrement is deposited on the ground, or where drainage may be into the spring either from the surface or beneath the surface, are extremely liable to sewage pollution and therefore their use under existing conditions is prejudicial to public health. You are, therefore, requested to close up such springs or to properly safe-

guard them. A resort so favored as Mt. Gretna with water suffers if the natural springs be abandoned. Preferably the springs should be maintained and protected.

Attention should be directed to the proper disposal of sewage. A rigid sanitary control should be maintained to prevent nuisances being created.

The springs should be walled up, all surface water kept out and sills provided at the overflows, so that people wishing to drink therefrom may not accidently pollute the spring by foot-wear, or be obliged to get their feet wet. Drainage away from each spring should be secured. You are requested to do these things immediately. If the springs are not properly protected I shall be obliged to post warning signs at all unprotected springs on your grounds. I shall be very glad to place an inspector of this Department at Mt. Gretna to co-operate with you and to render you any further assistance in my power. Relative to the sanitary patrol which you are requested to establish during the season, it seems fitting that the United Ice and Coal Company should also maintain one to preserve the purity of the source of its ice supply at Conewago Lake and at the lake on the north branch of the creek. Bathing may be permitted in the lake providing the disposition of excrement on the watershed is prohibited and stopped. I am on this day communicating with the ice company about this subject. Relative to the disposal of sewage, the great essential is to afford commodious and model lavoratories, one for men and one for women, conveniently located and placed in charge of an attendant. Nothing can contribute more to the continued success of a park than adequate toilet facilities. Efficiency and economy would dictate that these buildings should be fitted with modern water closets and that sewers should be provided, and all buildings in the grounds needing sewerage facilities connected therewith. I cannot urge too strongly the importance of the establishment of such lavoratories and sewers. It is unlawful for any private company or individual to empty sewage into any of the waters of the State. I shall be glad to co-operate with you relative to plans for the disposition of the sewage from your grounds, provided you decide to construct sewers.

Some time will be required for perfection of plans for the lavoratories and the sewers. Meantime, adequate temporary privies should be provided, and placed in the hands of a caretaker, whose duties should be to keep the places clean and properly limed and disinfected. The privies should be housed over and the doors screened.

It appears that garbage and refuse is collected and deposited in a receptacle at the restaurant from which it is removed to the incinerating plant. You are requested to have this receptacle properly and effectually screened to keep flies out. It should be frequently washed and disinfected.

With emphasis, I wish to state that a repetition of the great typhoid epidemics in Pennsylvania, such as at Scranton, Nanticoke, Butler and Plymouth, is highly probable if local conditions be not changed. To lightly treat and pass by the conditions would be criminal. Because an epidemic has not occurred at Mt. Gretna, this witnesses to providential security only, which must not be accepted as guaranteed immunity. The Department will assist all it can.

It is proposed to do something more than advise. A great deal can be done through co-operation, which is otherwise impossible of quick accomplishment.

Yours truly,
SAMUEL G. DIXON,
Commissioner of Health."

"Harrisburg, Pa., June 28th, 1907.

The United Ice and Coal Company,
Cowden and Forster Sts., Harrisburg, Pa.

Gentlemen: I am informed that you own, or lease and operate ice storage buildings at Mt. Gretna, Lebanon county, Pa., and that the ice supply is harvested from Lake Conewago and a pond on the north branch of the Conewago Creek. Both of these sources are liable to serious sewage pollution. Inadequate privy accommodations at the general public picnic grounds force visitors to commit sanitary offenses at points on the surface of the ground whence the excrement may be washed into the streams. Among other things, I have advised and requested the management of Mt. Gretna Park to provide ample privy capacity and to maintain a sanitary patrol. If you value the ice privilege and expect to continue its use, I beg to suggest and advise it to be for your interests and the interests of the public that you also maintain a sanitary patrol to preserve the purity of the source of your supply. It is far from my desire to stir up trouble. This Department wishes to co-operate with you and others to the end that the interests of all concerned shall be conserved. I hope to receive an early and favorable reply.

Yours truly,
SAMUEL G. DIXON.
Commissioner of Health."

BACTERIOLOGICAL TESTS OF DRINKING WATERS AT AND NEAR PICNIC GROVE.

	No. of sample.	Date of collection.	Total Bac. per c. c.	Colon per c. c.
Springs in Grove:				
At bowling alley,	143	June 4	60	0
Near pavilion,	144	June 4	30	0
East of pavilion,	145	June 4	40	0
Springs east of Grove:				
Road near hen house,	147	June 4	6	0
At Kauffman residence,	137	June 4	200	0
On hill above residence,	136	June 4	6	0
Springs north of Grove:				
In stone quarry,	142	June 4	28	0
Above dam,	141	June 4	350	0
Williamson dug well,	148	June 4	1,200	0
West of Grove:				
Spring back of boathouse; spring below crematory,	230	June 22	3,000	0
Fisher's creek,	126	June 4	11,000	70
Railroad water tank,	5c	June 22	360	4

There are doubtless other springs in the park obscurely located, beside the one below the crematory. In event of no heed being taken to the request of the Commissioner of Health for the estab-

lishment by the private companies of sanitary patrols and the erection of ample privy accommodations, upon the first indication of sewage pollution of the springs and surface waters being revealed by tests to be regularly made by the State during the summer, warning signs will be posted and, if necessary, the springs will be abandoned, if not voluntarily, then by order.

The garbage problem is an important one and the facilities are ample. The success of the plan is in its carrying out. If the refuse is daily gathered and incinerated the operation is sanitary. Adequate sanitary patrol would prove a valuable adjunct to the garbage collection service and thus minimize the "fly-pest nuisance."

Military Reservation.

The Military Reservation is as previously stated, under the same management as the railroad. It comprises within the camp limits a tract of about 375 acres lying south of the railroad, between Mt. Gretna station on the east, the Lake and Conewago creek on the south, the forks of the main creek and its North Branch at the extreme west, and the railroad on the west and north. Its length along the railroad is about 1.5 miles, its width at Mt. Gretna station one-third of a mile, and its extreme width three-quarters of a mile. This is in the center of the tract east and west, and about midway between the railroad and the creek is the highest hill which forms the beginning of a ridge extending northwesterly, sloping to and running out at or near railroad. This ridge is the controlling topographical feature of the reservation. The southern slopes shed water to the Conewago, and the northern slopes for three-fourths of the length of the ridge nearest the railroad, shed water northward through culverts under the railroad bed to the North Branch of the creek, whose course is just beyond the railroad in the woods. The northern slopes of the high hill and at least two-thirds of the eastern portion of the reservation where the parade grounds are, drains towards the creek and Conewago Lake. Beginning at the station there is a narrow strip abutting the railroad for a distance of about 3,500 feet, where the tents are usually pitched, that is within the drainage area of the creek north of the railroad.

Here during the last eighteen years, but not annually, the National Guard of Pennsylvania has encamped for field manoeuvres. In 1898 when the troops were mobilized, as high as 11,000 men were assembled. In 1900, a division of 10,000 men were encamped. In 1901, the Third Brigade, 3,000 men; in 1902, a division; in 1903, the Third Brigade and in 1905 the Third Brigade again.

The owners do not make a rental charge for use of the camp site or for hundreds of acres of adjoining territory necessary for the military exercises.

The term of the encampments has usually been a week.

Paralleling the railroad and distant therefrom about 175 feet is a four inch line of water main provided by the owners of the grounds to supply water to the camps. Between this water pipe and the railroad have been located the sink holes, one opposite the foot of alternate company tent lines, or even more frequent, for the reception of sewage and other refuse. The content was protected from flies, dry earth thrown in on top, together with disinfection, if neces-

sary and as often as each pit became filled it was covered with earth and a new hole dug. Some garbage was thrown in with the sewage. South of the water pipe line, near it and at the foot of each company mess tent, the kitchens were located. Kitchen refuse was also deposited in sinks, so the edge of the camp along the railroad has been literally punctured with cesspools and pits in which the aggregate large quantities of excreta and garbage have been buried. In consequence, the ground there must have received by this time at least the full quota of organic putrefying matter which it is capable of retaining without creating a nuisance. Evidence has been obtained that for a year subsequent to a divisional encampment, on wet days or immediately thereafter, odors emanate from the ground in the vicinity of the sinks last used. The area of the reservation does not make it convenient to select a new camp site, and in consequence, if a division were to encamp on the same site annually, the demands of sanitation would require the adoption of some other method of waste disposal. At the present time there seems to be no offensive odor in the territory taken up by the covered holes.

The stable manure from the cavalry camps has been hauled away by farmers as fast as it has accumulated.

The surface soil on the grounds is porous and absorbent and rain water, even after a heavy shower of thirty minutes' duration, rapidly soaks away. It may be said that surface drainage is ideal in the camp.

The water supply for the camp is obtained from a small artificial reservoir created by dam across the creek just north of the railroad opposite the central part of the reservation. Its storage capacity is said to be 75,000 gallons. The watershed is small, wooded and there are two streams flowing into the reservoir. One of them nearest the reservoir and most liable to surface pollution has been ditched by the dam. The reservoir water is raised by a pump into a concrete distributing reservoir housed over under lock and key and said to contain 40,000 gallons. This reservoir is located on one of the lower hills within the encampment ground, and its elevation is about equal to the dam of the picnic ground water supply system. The pipes of the latter system have a connection with the pipe system of the military grounds.

About half a mile below the reservoir on the same stream, there is a pond where ice is harvested and stored in an adjacent building.

BACTERIOLOGICAL TESTS OF SURFACE WATERS AT OR NEAR MILITARY GROUNDS.

	No. of sample.	Date of collection.	Total Bac. per c. c.	Colon per c. c.
At pumping station,	121	June 4	1,800	0
Ice pond below,	146	June 5	16	0
Tributary ice pond,	40	June 22	2,000	0

Judged from these tests, the waters are safe for drinking. However, they were condemned by Federal Military Authorities in the summer of 1906.

A camp of instruction was established at Mt. Gretna during July, August and the first two weeks in September of 1906 by the U. S. War Department, F. D. Grant, Major General, U. S. A., commanding. It was named Camp Roosevelt. Certain State military organization were authorized to attend to receive advanced instruction in military tactics.

The duration of the encampment made it more like a post with respect to problems of sewage and garbage disposal, water supply, bathing and supplies.

The main body of the troops arrived during the last week in July. A detachment of the regulars went to Gretna in advance.

The cavalry camped on the military reservation south of the ridge 450 feet from the Conewago Creek and below the sewage purification works. The infantry camped on the grounds along the railroad. Twenty-three hundred acres of farm land in the Conewago valley below were leased for the extensive field manoeuvres.

The State military organizations in attendance numbered 518 officers, 6,042 men and 223 animals. The U. S. Regulars totalled 161 officers, 3,073 men and 1,359 animals. The largest number on any one day at the camp, including visitors, was about 6,500 officers and men and 1,500 animals.

The preparations for the encampment were extraordinary and made necessary by its scheduled duration and the local conditions. Water pipes were laid from the existing water main to each organization camp site. Liquid slop pits in rear of each company kitchen were dug four feet deep, five feet long and three feet wide, covered over with earth fitted at one end on top with an inlet box containing a galvanized iron tank perforated, the box covered with a light lid and placed level with the ground. Thus flies were kept out, the liquid passed into the pit below and the solid refuse remained in the strainer. The Reed trough system of latrines was installed, one for each 100 men. The troughs were 12 feet long, 16 inches deep, had drop lids and were operated with water, all draining to the latrine pit. Lime was furnished for disinfection. The troughs were housed over, covered with canvas on top and tarred paper on sides.

It was ascertained that the underground at the camp site was not sufficiently porous to carry away the large volumes of water poured into the kitchen sinks and latrine pits, and in consequence, two excavator wagons were provided and the kitchen sinks had to be pumped out three times weekly and the latrine pits daily and from thence the contents were removed by the wagons to large pits dug in the ground in the valley of the Conewago Creek up stream from the cavalry camp, 900 feet distant from the camp on a line towards and 1,600 feet distant from the State Rifle Range.

Some 120 men engaged in preparations during the early part of July used the customary pit system. Earth was thrown into the pit daily and milk of lime added frequently. However, the soldiers crossed the railroad tracks and civilians also, and committed nuisances on the banks of the stream affording the source of drinking water to the military reservation. Tests of this water on July

23rd, proved it to be contaminated. On this date sanitary circular No. 1 was issued prohibiting the use of Conewago Creek water, warning against drinking camp water, forbidding entrance to the woods above the dam whence the supply of water to the camp was obtained and ordering sufficient quantities of boiled water to be kept on hand for encampment uses.

Liability to contamination of the camp's water supply from the crowds of visitors to picnic grounds and vicinity, increasing, on August 9th, the second sanitary circular was issued, forbidding the use of unboiled water and ordering the inspection of all foods and drinks to prevent outbreak of diarrhea. On August 15th, the third circular was issued, establishing squads of scavengers to do the work of camp sanitation, such as cleaning and disinfection of sinks and pits and appurtenances, the cleaning and daily burning out of garbage receptacles, etc.

Forty-four shower baths were erected at the camps, a water sprinkling cart provided to lay the dust, hospitals, kitchens and food stuffs were screened to keep out flies and a man was detailed to attend the water supply of each company. Between August 7th and 13th, the wells and springs on the manoeuvre site were inspected and 60 different places posted with signs indicative of whether the waters were good or bad.

Because the Conewago Lake is polluted by bathing and defecation on its shores, care was taken that ice used in camp had not been cut from said lake. Tests of water of the springs all through Mt. Gretna Park were made and suspicious sources were guarded for a time. Water carts to carry boiled water for use of troops in manoeuvres and at one night camps or on marches in the country where streams were bad, were provided. A Forbes sterilizer was provided for each two companies. This device was afterwards found ineffectual as a sterilizer.

Camp garbage was first emptied into a pit located near the open cesspools receiving the excavator wagon liquids. An intolerable stench noticeable a half mile distant was thus created, so the small crematory below the sewage disposal works on Conewago Creek was used and found inadequate. Another and larger one was built along side and the offal was therein incinerated. Cord wood was the fuel. It was found that a modern crematory adapted for the purpose was needed for a camp of this size and duration.

As late as the last week of the encampment, sanitary offences on the watershed of the camp supply were reported.

Between July 25th and September 13th, 389 cases were treated at the Base Hospital. One hundred and forty-two of these were acute diarrhea of mild form. Four cases of typhoid fever were reported as resulting from causes existing in the neighborhood. A death from this disease occurred at Lawn on August 8th. Many of the regulars visited this village and infection was thought to have existed there.

Taking all things into consideration, the camp was a remarkably healthy one, as previous camps at Mt. Gretna had been. This is a tribute to the efficiency of the Federal Military authorities and to the officers of the National Guard of Pennsylvania.

No one can tell how essential measures, which may be considered extreme, are when measured by results equally good under less ex-

acting sanitary regulations; but it may be stated with emphasis that upon the individual observance of health precautions, and the administration of general health regulations, depends the efficiency of an army.

The liability to the pollution of surface waters of any military camp or its vicinity is always great. More especially is it so at Mt. Gretna Park, where many thousands of people congregate daily for other purposes than visitation to the military reservation. If infection once gets into a water works system, the avenues of transmission may be multiplied manifold, and in this sense the disease becomes contagious. If Mt. Gretna is to be continued as a site for recurring State divisional encampments, two great permanent improvements are demanded on the military reservation; first, a pure water supply and second, a permanent sewerage system.

An effort is now being made to obtain pure water. Mr. Smith has had a well drilled on the hill near the distributing reservoir in the military reservation, erected a pump house there and a pumping engine. The hole was drilled 8 inches in diameter through about 50 feet of sand rock, 330 feet of sand and gravel and 50 feet of hard rock, where the drilling ceased. An outside casing pipe was inserted in this hole to a depth of about 35 feet, and into this was placed the 6 inch suction pipe extending down the surface of the ground. The top of the well on the hill is from 50 to 70 feet higher than the parade grounds.

The pump at this well was started on June 12th, 1907, and continued in operation at irregular intervals until the last week in June, when the connection between the rod and the plunger broke and the plunger now lies at the bottom of the well.

Tests of the waters pumped at the beginning and at the end, and between the two dates, numbering all told 23 bacteriological samples and two chemical samples, were made by the Department. None of these samples were clear water. They containd fine sediment of brick-red color characteristic of red sandstone. This sediment would remain suspended for several days. A sample collected on June 14th had not cleared up on June 24th. The first day's samples showed colon and the third day's sample. A very marked diminution in the total bacterial count was noticeable on the last day's test.

BACTERIOLOGICAL TESTS OF DEEP WELL WATER—MILITARY RESERVATION.

No. sample.	Date of Collection.	Total Bac. per c. c.	Colon per c. c.
200	June 12,	6,000	6
201	June 12,	5,400	0
202	June 12,	3,600	30
203	June 12,	560	0
204	June 12,	1,000	0
205	June 12,	840	0
207	June 14,	3,000	0
208	June 14,	3,200	0
209	June 14,	10,000	0
210	June 14,	8,000	0
211	June 14,	4,800	0
212	June 14,	5,400	0
255	June 22,	150,000	0
256	June 22,	28,000	0
257	June 22,	30,000	0
258	June 22,	20,000	0
259	June 22,	38,000	40
261	June 24,	70	0
262	June 24,	60	0
263	June 24,	200	0
264	June 24,	34	0
265	June 24,	100	0
266	June 24,	210	0

It is too early to form a reliable opinion as to whether the presence of colon in the samples indicates sewage pollution. It would eventually be obtained from the well.

Samples 206-254 were analyzed chemically, giving identical results and showing superior water. Sample 206 was collected on June 12th and sample 254 on June 22nd.

CHEMICAL EXAMINATION OF DEEP WELL WATER—MILITARY RESERVATION.

Parts Per Million.

Free ammonia,	None.
Albuminoid ammonia,	None.
Nitrogen as nitrates,	Trace.
Nitrogen as nitrates,	None.
Chlorine,	5.8
Organic matter,	None.
Total solids,	120 (largely silica).

Unless the pumping machinery is repaired and immediately put in commission, the water supply to the military grounds must continue to be furnished from the existing source. Since in any event the surface supply would be held in reserve and used in emergencies, a permanent filtration plant should be erected for the purification of the surface water. Meantime no unboiled water should be used for drinking and culinary purposes at the military reservation, provided, of course, that the supply be not from the deep well.

Relative to a permanent sewerage system it is possible for sewers to be provided to convey the sewage from not only the military reservation but also from the general picnic grounds, camp meeting and Chautauqua Assembly to one and the same point for treatment.

The State could afford to assume a share of the expense of building the sewers. The present sewage disposal works, belonging to the Chautauqua Association and located on the military reservation south of the ridge on the banks of the creek below the ice house needs to be enlarged and remodeled. It is an opportune time to consider the advisability of reconstructing the works on a scale comprehensive enough to deal with all of the sewage of the Mt. Gretna district, including the State Rifle Range.

The improvements demanded outside of the military reservation, hereinbefore mentioned, and those within, were made the subject of communication from the Commissioner of Health to the management of the Cornwall and Lebanon Railroad Company, dated July 1st, 1907. The following is a copy:

Mr. A. D. Smith, Lebanon, Pa.:

Dear Sir: Enclosed you will please find copy of tests of water collected from the deep well on the military grounds at Mt. Gretna. It is too early to decide what the colon present signify. A pure supply ought to be furnished from this well. Meantime no unboiled water should be used at the camp, and I am advising the military authorities to this effect. You should install a permanent filter for the purification of all waters of surface origin because even if the driven well supply be secured for the camp this summer, you will have recourse to the present surface supply in case of emergency.

The soil at the camp site should not be further burdened with sewage and garbage. The latter should all be incinerated and the former should be removed from the premises in permanently laid sewers operated by water. I have advised the Adjutant General that the State might contribute with reason towards the cost of the camp sewers. I beg to suggest to you that the question of permanent sewerage for the entire district, including all the camps and the grounds in Mt. Gretna, be taken up and considered together with an improved sewage disposal plant for the purification of the sewage. My Department will extend the heartiest co-operation in the support of such a proposition and the preparation of the plans therefor.

Through your courtesy the State Militia are again to encamp at Mt. Gretna. The water scare of 1906 appears to have been founded upon some facts which warranted so-called extreme measures then. The conditions have not changed and I have posted warning signs along the streams and lakes and at springs and wells in the valley of the Conewago and in Mt. Gretna Park where bacteriological tests made by my Department show this to be necessary.

Soldiers will drink most convenient water, when thirsty, in spite of all admonitions to the contrary. There is great need of prevention of pollution; first, of the surfaces of the ground and next, the streams thereon. I shall establish a State Health Patrol and station men to collect regular water samples. I apprehend that springs not now contaminated will soon show signs of pollution whereupon I shall close the wells or springs. There is no suitable place provided for the hosts of visitors in the way of sanitaries and hence the woods and bushes are sought. The practical way to stop this is for you and others to compel the use of the sanitaries. In this way the flagrant abuses of health precautions at Mt. Gretna

will be obviated and the dangers from pollutions greatly minimized. Beyond this, however, patrols will be always essential and the treatment of the sewage a necessity.

Your attention is also called to the fact that you have not submitted plans of the water supply system according to law, or filed an application for approval of the additional supply from the deep well. These laws were enacted to be complied with and I am enclosing a blank form of application.

Hoping to hear from you favorably, I am,

Yours truly,

SAMUEL G. DIXON,
Commisisoner of Health.

RECOMMENDATIONS.

In conclusion, it is understood that the military camp site at Mt. Gretna, being adjacent to the picnic, camp meeting and Chautauqua grounds, and condemned as a good site from the standpoint of sanitation by the U. S. War Department officers, has made doubly necessary special attention to general health precautions and personal hygiene.

So far as the latter comes under the administrative duties of the militia authorities, it is understood that the aid of the State Department of Health has not been evoked, but otherwse it has. In view of these circumstances and in addition to the actions already taken by the State Department of Health it is further suggested.

First, that the necessity be emphasized of the promulgation by the military officers of an order that no unboiled water for domestic purposes shall be used at the camps.

Second, that the soldiers be forbidden to drink from any surface streams or from springs unposted out of the public cup but that instead they use their individual drinking cups and that due attention be paid to the various warning notices.

Third, that a sanitary patrol be maintained in the woods north of the railroad above the dam and pump house from whence the camp's water supply is to be obtained, or anywhere on the water shed thereof, to prevent civilians or anybody from committing sanitary nuisances there.

Fourth, that orders be issued forbidding the soldiers to enter these woods.

Fifth, and finally, it is well known from more recent discoveries that flies may carry typhoid infection, and therefore, in camp and in civil life, precautions are necessary to keep flies away from food stuffs, and from the effete waste products of human existence. Hence, as is well known, the most careful screening of entrances to kitchen sinks, latrine pits, all receptacles for sewage or garbage and all buildings of the commissary department, where exposed food stuffs are kept, to kitchens and hospitals, is not only necessary as a health precaution for camp life, but exerts a powerful instructive lesson to civilians who may visit these encampments. Therefore, particular attention to these details is urged in the general interests of the public health. And further, it is a well known fact the urine

contains countless numbers of the typhoid bacilli a long time after convalescence of the patient, and that, therefore, danger from this source is equally as great as from bowel discharges of the convalescent. Hence, every precaution is necessary to prevent the men from fouling camp sites by urine or excrement and proper receptacles should be afforded each company. The habit of urinating about the camp at night, whether in bivouac, or at encampment, can only be stopped when urine tubs are provided and placed in the company streets at night or at the tents at a night stand. Efficient policing is necessary to enforce the proper use and disinfection of these facilities. Men should be forbidden to urinate or defecate on the ground anywhere within or without the encampment. No better opportunity is afforded for instruction of officers and soldiers relative to the principles and details of personal and camp hygiene than during the encampment. Mosquito netting for tents should be provided and used if necessary.

The State Department of Health is undertaking to maintain sanitary precautions outside of the camp, but the undertaking was started too late to assure ideal results this season. Interior camp sanitation will depend on the efficiency or organization and administration by the officers of the National Guard.

Harrisburg, Pa., July 2, 1907.

Office of the State Department of Health.

(Signed) SAMUEL G. DIXON,
Commissioner of Health.

The Department maintained a sanitary patrol and gathered water samples and examined the same bacteriologically throughout the summer and late into the fall to the end of the resort season. In the following table appears the results of some of the water examinations during the months of July, August and September. The pollutions occurred chiefly while the season was at its height and there were two thousand of people at the resort. Warnings were given and signs posted and owners of wells and springs notified of the pollutions. Too much care cannot be taken at resorts to keep the water supply pure.

Location.	No. of sample.	Samples.	Pollutions.
Rifle Range:			
Spring on hill,	124	13	1
Grant Fisher spring,	125	2	2
Spring in valley,	127	13	0
Tap,	340	3	0
Near spring on hill,	338	6	1
Chautauqua Assembly Grounds:			
Medicinal spring,	129	13	3
Pump at inn,	130	7	2
Tap on grounds,	131	17	2
Stream at Kauffman's,	133	5	2
Spring in grounds,	300	21	2
Reservoir on grounds,	334	13	3
Conewago lake,	336	13	7
Camp Meeting Grounds:			
Pump at spring near run,	132	22	10
Pump, Springside cottage,	134	14	0

WATER EXAMINATIONS—Continued.

Location.	No. of sample.	Samples.	Pollutions.
Pump near Rudy's,	135	12	1
Pump on hill,	139	12	0
Tap from deep well,	140	12	0
General Picnic Grounds:			
Spring back Kauffman's residence,	136	20	2
Spring at Kauffman's residence,	137	20	5
Spring above dam,	141	9	1
In stone quarry,	142	9	2
At bowling alley,	143	15	1
Near pavilion,	144	18	2
East of pavilion,	145	18	1
Near henhouse,	147	19	4
Williamson dug well,	148	3	2
Spring near ice house,	306	7	1
Second spring near ice house,	307	7	1
Faucet, Mt. Gretna station,	332	5	4
Spring near stable,	333	7	1
Well, Kauffman's stable,	335	5	0
Reservoir above brickyard,	339	7	3
Pump near brickyard,	341	4	3
Spring near hitching park,	342	7	3
At or Near Military Reservation:			
Dam, old pumping station,	121	12	4
Spring above bath house,	301	16	5
In ravine near reservoir,	302	6	1
In ravine near parade grounds,	303	4	1
Spring, west railroad,	304	7	1
Spring, opposite Mt. Gretna station,	305	10	0
Guard house,	320	6	0
Tap, 12th regiment,	321	6	0
Tap, 8th regiment,	322	5	1
Reservoir, parade grounds,	324	5	1
Pipe in parade grounds,	325	3	0
Faucet, military headquarters,	331	6	0
	.....	464	89

(b) RAILROAD WATER SUPPLY.

Typhoid fever appears among railroad employes more generally than among any other distinctive class. This is due in a measure to the large number of men who are employed by the railroads and it is also due in a measure to the sewage pollution of the waters which the men drink. It is known that often railroad employes drink water from locomotive tenders and water tanks, which water is not intended to be used for drinking purposes. It is not feasible for the railroads to always furnish a drinking water for steaming purposes and, therefore, so long as employes will drink this water there will be resulting sickness. However, it is the intention of the State Department of Health to minimize the danger by removing pollutions of the surface waters which are the sources of supply to the railroads.

Some of the drinking water supplied to passenger coaches and at the stations, yards and shops of the railroad companies, comes from polluted or dangerous sources.

Before undertaking the removal of all menaces to the purity of the water supplies of the railroads, it is necessary that the Department should be possessed of the information concerning the sources. During the summer a special force of men were assigned to the work of traversing the lines of railroads of Pennsylvania and of noting the uses of water by each railroad company and the source of the water used.

There are in the State seven principal railroad systems, namely, the Pennsylvania, the Philadelphia and Reading, the Lehigh Valley, the New York Central and Hudson River, the Buffalo, Rochester and Pittsburgh, the Baltimore and Ohio and the Erie Railroad systems, totalling about 6,000 miles. There are also 190 independent lines of steam railroads, having a mileage of about 4,500 miles, so all told, there are about 10,500 miles of steam railroads in Pennsylvania, giving employment to a small army of men and affording the main support to several hundred thousand people. The prevention of pathogenic pollution of the waters consumed by this class for drinking purposes will result in a marked diminution of water-borne diseases in Pennsylvania. The data collected are now being tabulated and arranged in convenient form on maps and sheets for reference.

(c) MISCELLANEOUS.

Various matters pertaining to stream pollution have been the subject of inquiry by the assistant engineers and by experts temporarily employed to make investigations and reports. Among other places considered were the following: West Chester, State Hospital at Warren, the State Hospital at Danville, Devon and Ambler. Also all of the boroughs in Berks County. The Central Poor District of Luzerne county whose hospital buildings are located at Retreat Station had an increased water supply problem up for advice. It is treated elsewhere in this report.

The following report was printed in the report of the State Sewerage Commission of New Jersey to the Legislature of 1907 of New Jersey.

Delaware River Statistics for Pennsylvania.

Commonwealth of Pennsylvania,
Department of Health,
Engineering Division.
Samuel G. Dixon, M. D., Commissioner.
F. Herbert Snow, Chief Engineer.

Sewerage and Water Works Systems in the Delaware River Basin in Pennsylvania.

The collection of statistics relative to the sewage pollution of the Delaware river and its tributaries was undertaken in pursuance of an understanding reached during the summer of 1906 by the Commissioner of Health of the State of New Jersey, and the Commissioner of Health of the Commonwealth of Pennsylvania.

Several towns obtain their drinking water from the Delaware river. Some of them are in New Jersey and others are in the State of Pennsylvania. The principal ones are as follows:

Chester, Pa.,
Philadelphia, Pa.,
Bristol, Pa.,
Riverside, N. J.,
Palmyra, N. J.,
Philipsburg, N. J.,
Riverton, N. J.,
Burlington, N. J.,
Trenton, N. J.,
Morrisville, Pa.,
Easton, Pa.

The river receives large volumes of sewage and is a carrier of infection. The use of the water for domestic purposes is necessary, but perilous, and will be so long as the stream is defiled by sewage.

The Purity Water Act of 1905, entitled "An Act to Preserve the Purity of the Waters of the State for the Protection of the Public Health," places the matter of sewerage and water works extensions in Pennsylvania in the hands of the Commissioner of Health. An application for permission to extend existing systems of water works and sewers, or to construct new systems, must be made in writing to the Commissioner of Health and no such extensions or new systems shall be built without a written permit by the State.

It would be futile for Pennsylvania to prohibit the discharge of sewage into the Delaware river or its tributaries, if the states of New Jersey and New York did not enforce similar prohibitions in their respective jurisdictions. For the purpose of ascertaining what action, if any, had been taken relative to the subject, a conference was held in Philadelphia on March 10th, 1906, between the Governors of New Jersey and Pennsylvania and other State officials, and later, September 14th, at Atlantic City, between the State Health Commissioners of New York and Pennsylvania and the State Sewerage Commission of New Jersey. These conferences brought out the fact that New Jersey had already accomplished considerable work respecting the purification of municipal sewage, while the states of New York and Pennsylvania had yet to make a beginning in this work within the Delaware river basin.

It was unanimously determined at that time that the general interests of the public health demand a double safeguard against the danger of using, as a source of public supply, water polluted by sewage. The filtration of a sewage polluted water is not alone sufficient protection. The first safeguard should be the minimizing or prevention of the pollution. Sewage disposal plants should be provided everywhere, and the purified effluent only from such plants should be discharged into the waters used subsequently for drinking purposes.

The conference concluded with the understanding that each State should contribute a report on the sewerage and water works systems within its own territory in the Delaware river basin.

The Delaware River Basin.

The Delaware river rises in New York State and flows southwesterly towards Pennsylvania, to the town of Deposit, in Broome county, New York, a few miles north of the Pennsylvania line. Here it turns at about right angles and flows in a southeasterly direction, a distance of about one hundred miles, to Port Jervis, this stretch forming the boundary line between New York and Pennsylvania. Above Port Jervis, the basin is a sparsely populated elevated tableland, the bed of the stream being in a somewhat deep, narrow trough.

At Port Jervis the river emerges into the broad, open, deep valley of Minisink, which it traverses for about forty miles in a southwesterly direction, along the base west of the Kittatinny Range to the Delaware Water Gap. This part of the basin is well wooded and sparsely settled. It is renowned for its beauty.

Passing through the Water Gap, the river crosses the Appalachian valley to where it enters the South Mountains below Easton. The topography is different in this stretch, the surface of the country being rolling from one to two hundred feet only above the stream. Below South Mountain, hills and valleys in succession border the river as far as Trenton, where the rapids are. Below Trenton the river becomes a wide tidal stream having banks of sand or gravel or bounded by broad marshes.

The declivity of the river is shown by the following elevations taken from the U. S. Geological Survey.

Place.	Elevation in feet above mean sea level.
Deposit,	500
Port Jervis,	411
Water Gap,	287
Belvidere,	229
Easton,	150
Frenchtown,	101
Lambertville,	52

From Port Jervis, the river is the boundary line between New Jersey and Pennsylvania. Its length from Deposit to the head of the bay at Reedy Island is 360 miles, and to the capes 410 miles. It is navigable to Trenton, a distance of 120 miles from the capes.

The main tributaries of the Delaware river are in Pennsylvania. They are the Schuylkill river, entering the Delaware at Philadelphia, and the Lehigh river entering the Delaware at Easton.

Area and Population of Basin in Pennsylvania.

The area above the city of Philadelphia, including the Schuylkill river, comprises 10,100 square miles, of which 2,580 are in the State of New York, 5,720 in the State of Pennsylvania and 1,800 in the State of New Jersey. Below Philadelphia, in Pennsylvania, there are 854 square miles draining into the river, and 545 in New Jersey, making a total area in Pennsylvania of 6,574 square miles, and 2,345 square miles in New Jersey in the basin above the entrance of the river into Delaware Bay. These areas are respectively 14.5 and 44 per cent. of the total area of Pennsylvania and the total area of New Jersey.

In Pennsylvania, over 35 per cent. of the entire State population resides in the Delaware river basin, and in New Jersey about 20 per cent. of its population resides in said basin. The total estimated population in the watershed of 3,006,300 is distributed in the three states as follows: New York, 85,200; New Jersey, 466,000 and in Pennsylvania, 2,455,900. The following table shows the distribution in Pennsylvania by counties wholly or partly in said basin, gives the area of square miles of watershed in each county and the estimated population in 1906, urban and rural, on the watershed in each county.

Distribution of Population by Counties in Pennsylvania.

County.		Area watershed in sq. mi.	Estimated Population in Watershed 1906.		
Wholly in Watershed.	Partly in Watershed.		Urban.	Rural.	Total.
Bucks,		595	25,500	46,000	71,500
Carbon,		402	27,400	20,300	47,700
Delaware,		195	69,400	36,400	105,800
Lehigh,		364	59,600	43,800	103,400
Monroe,		595	7,600	14,100	21,700
Montgomery,		484	69,400	78,200	147,600
Northampton,		382	71,200	37,000	108,200
Pike,		631	900	7,900	8,800
Philadelphia,		130	1,429,400	.....	1,429,400
	Lebanon,	57	.....	7,800	7,800
	Berks,	814	96,900	65,900	162,800
	Chester,	629	28,400	59,400	87,8 0
	Luzerne,	117	25,900	7,900	33,800
	Lackawanna,	68	100	1,900	2,000
	Schuylkill,	383	50,700	37,400	88,100
	Wayne,	728	5,400	23,100	28,500
		6,574	1,967,800	467,100	2,454,900

In 1900, the population on the Delaware river basin in Pennsylvania was distributed in six cities, 138 boroughs and 348 townships, as follows: in the cities 1,473,615, in the boroughs 304,955 and in the townships 460,211.

Sewage is discharged into natural water courses in most of these municipalities. However, general sewage systems are not the rule. Private sewers exist in every town visited. A few of them are comprehensive enough to be called sewer systems. Drains for the removal of storm water, into which some sewage finds its way, abound.

For purposes of this report, sources of sewage pollution are divided into two clases, viz., major sources—which comprise municipal systems, either public or private, which are used extensively enough to be considered menaces of public origin; and minor sources —which comprise individual sewers and industrial or trade waste contaminations.

Delaware Basin above Lehigh River in Pennsylvania.

Above the city of Easton and the mouth of the Lehigh river, there is an area of 1,740 square miles in Pennsylvania embraced by the Delaware river basin. On this area, covering all or parts of Wayne, Lackawanna, Pike, Monroe and Northampton counties, are 57 townships and 15 boroughs, having a population in 1900 of 79,207, of which 24,568 were in the boroughs. The five major sources of pollution here are shown in the following table:

Borough.	County.	Pop.	Remarks.	Streams Receiving Sewage.
Honesdale, ...	Wayne, ...	3,000	Sewers receive storm water,	Lackawaxen.
E. Stroudsburg,..	Monroe, ...	3,100	Receive storm water, ...	Brodhead.
Stroudsburg, ...	Monroe, ...	4,000	Private ownership of sewers,	Brodhead.
Portland, ...	Northampton, ...	490	Private ownership of sewers,	Delaware river.
Bangor, ...	Northampton, ...	4,980	Private sewers, ...	Martin creek.

With the exception of Portland borough, the above places are supplied with a system of water works. The sources are obtained from mountain springs and from surface water, which are not known to be polluted by sewage. The boroughs of East Bangor, Pen Argyl and Nazareth also have public water works.

The city of Easton obtains its supply from the Delaware river. An intake crib is located in the bed of the channel and serves as a strainer and rapid filter. Undoubtedly it affords some protection. Bangor is 13 miles above Easton on Martin's creek, Portland is 22 miles and the Water Gap 27 miles above Easton on the main river, and Stroudsburg is on a tributary 32 miles above Easton. The fall of the river from these places to Easton is from 75 to 100 feet, occurring in a series of alternating rapids and pools which greatly facilitate purification. Frequent analyses of the water, made at the laboratories of Lafayette College, Easton, have revealed the presence of a very small number of colon bacilli.

Lehigh River Watershed.

The quality of the river water of the Delaware changes at Easton, at the mouth of the Lehigh.

The Lehigh River rises in Wayne county and flows in a general southerly direction to the city of Allentown, from whence its course is northeasterly to the Delaware river. The watershed is 1,332

square miles in extent, all within Pennsylvania, and comprises parts or all of Northampton, Lehigh, Bucks, Berks, Schuylkill, Carbon, Monroe, Luzerne, Lackawanna and Wayne counties. On this area there are 3 cities, 29 boroughs, and 65 townships, with a total population in 1900 of 67,769 in the cities, 66,739 in the boroughs and 99,624 in the townships.

Waste water from coal mines and other industrial pollutions materially influence the character of the river water. The 12 major sources of pollution by sewage are shown in the following table:

MAJOR POLLUTIONS ON LEHIGH RIVER WATERSHED.

Municipality.	County.	Pop.	Remarks.	Streams Receiving Sewage.
Easton, ...	Northampton, ...	30,150	Sewers receive storm water,	Lehigh river.
Bethlehem, ...	Northampton, ...	11,100	Private ownership of sewers,	Lehigh river.
S. Bethlehem, ...	Northampton, ...	15,000	Storm drains receive some house sewage.	Lehigh river.
Allentown (city),.	Lehigh, ...	41,000	Storm drains receive some house sewage.	Lehigh river.
Catasauqua, ...	Lehigh, ...	4,100	Storm drains and a few private sewers.	Lehigh river.
Palmerton (village).	Carbon, ...	2,500	Private system, ...	Sewage disposal works.
Mauch Chunk, ...	Carbon, ...	4,000	Private ownership of sewers,	Lehigh river.
E. Mauch Chunk,	Carbon, ...	3,700	Private ownership of sewers,	Lehigh river.
Summit Hill, ...	Carbon, ...	3,000	Storm drains receiving sewage.	Schuylkill river.
Hazleton (city), ..	Luzerne, ...	17,000	Sewers receive storm water,	Hazle creek.
W. Hazleton, ...	Luzerne, ...	3,300	Sewers receive storm water,	Hazle creek.
Freeland, ...	Luzerne, ...	6,500	Sewers receive storm water,	Cress creek.

The twelve municipalities above mentioned have public water works systems, and so do the following places in the water shed: Macungie, Emaus and Coplay boroughs in Lehigh county; Alliance in Northampton county; Perryville, Weissport, Lehighton, Waverly and East Side boroughs, in Carbon county; and White Haven borough, in Luzerne county; comprising an aggregate population of 22,896.

The Clear Spring Water Company furnishes water to Catasauqua, Coplay and Alliance. The company reports that a part of its supply is taken from the Lehigh river.

The Bethlehem City Water Company supplies Bethlehem, South Bethlehem, Fountain Hill, Ritersville and East Allentown. The total population in this district approximates 30,000. The water is pumped from the Lehigh river, and is subjected to purification in a sand filter plant of recent construction. Epidemics of typhoid fever, which occurred in the district in the past, usually after spring freshets, were attributed to the pollution of the water by sewage. The filter plant is constructed to obviate recurrences of disease from this cause.

Generally, there is not an unusual number of bacteria in the river, but during freshets the water not only becomes more impure from sewage, but it contains considerable amounts of fine culm which impart a very dark color. At other times industrial wastes give a reddish appearance to the water.

With the two exceptions noted, the sources of public water supply are not known to be polluted by sewage, although, of course, there is always a possibility of such pollution where a supply is obtained from surface waters draining from an inhabited area.

Delaware Basin Between Easton and Philadelphia in Pennsylvania.

Between Easton and Philadelphia, above the Schuylkill watershed, there is an area of 736 square miles in Pennsylvania within the Delaware river basin. It comprises a part of Northampton, Bucks, Montgomery and Philadelphia counties, including 17 boroughs, 38 townships and a part of one city, aggregating a population in 1900 of 663,400, divided as follows: 582,165 in the city, 24,539 in the boroughs and 56,696 in the townships.

The principal tributaries named in order up stream from the Schuylkill, are as follows:

Stream.	Entering Delaware River at	Drainage area, square miles.
Tacony creek,	Philadelphia county,	.....
Pennypack creek,	Philadelphia county,	.....
Neshaminy creek,	Opposite Beverly, N. J.,	228
Tohickon creek,	Point Pleasant, Pa.,	102

Both the Tacony and Pennypack creeks receive sewage discharged into them by sewers built and maintained by the city of Philadelphia. Their upper waters also in Cheltenham, Abington and Moreland townships are polluted by numerous private sewers not pretentious enough to be called sewer systems, and classed as major pollutions, yet in the aggregate amounting to serious contamination.

The following table names the places in which sewers have been built:

MAJOR POLLUTIONS BETWEEN EASTON AND PHILADELPHIA.

Municipality.	County.	Pop.	Remarks.	Streams Receiving Sewage.
Philadelphia,	Philadelphia,	600,000	Sewers receive storm water,	Delaware, Tacony, Pennypack.
Bristol,	Bucks,	8,000	Private ownership of sewers,	Delaware.
Doylestown,	Bucks,	3,500	Private corporation,	Sewage disposal plant overflow to Neshaminy creek.
Hatfield,	Montgomery,	528	Individual sewers,	Trib. to Neshaminy creek.
Quakertown,	Bucks,	4,000	Storm drains receiving some sewage.	Tohickon creek.

The above places have public water works, excepting Hatfield. Besides these there are eight other places between Easton and Philadelphia which have public water works, the populations thus supplied aggregating 11,500. They are as follows: Jenkintown, Hat-

boro and Lansdale boroughs, in Montgomery county, and Langhorne borough, Langhorne Manor, Newtown, Morrisville and Yardley boroughs in Bucks county. None of the sources are known to be sewage polluted, excepting the supply to Philadelphia, Bristol, and Quakertown, at each of which places purification of the water by filtration is attempted. The Quakertown supply is taken from Tohickon creek. The Bristol and Philadelphia supplies are taken from the Delaware river. Though the water be filtered, the supplies will never be safe until the discharge of all sewage therein shall have been discontinued.

Schuylkill River Watershed.

Upon the Schuylkill river watershed, which comprises parts of Philadelphia, Delaware, Montgomery, Chester, Bucks, Lehigh, Berks, Lebanon, Schuylkill and Carbon counties with a total drainage area of 1,912 square miles, there are 1 1-3 cities 51 boroughs, 131 townships with a population in 1900 of 725,000 in the cities, 140,787 in the boroughs and 188,438 in the townships.

The twenty-four major sources of sewage pollution are shown in the following table:

Municipality.	County.	Pop.	Remarks.	Streams Receiving Sewage.
Philadelphia, ...	Philadelphia, ...	650,000	Sewers receive storm water,	Schuylkill river.
Conshohocken, ...	Montgomery, ...	6,000	Storm drains; sewage supposed to be excluded.	Schuylkill river.
W. Conshohocken,	Montgomery, ...	2,118	One short public sewer, ...	Schuylkill river.
Norristown, ...	Montgomery, ...	27,000	Sewers receive storm water,	Schuylkill river.
Bridgeport, ...	Montgomery, ...	3,000	Street gutters deliver sewage to.	Canal.
North Wales, ...	Montgomery, ...	1,411	Private sewers, ...	Wissahickon Cr.
Souderton, ...	Montgomery, ...	1,450	Storm drains receive some sewage.	Skippack creek.
Pennsburg, ...	Montgomery, ...	1,254	Private system, ...	Perkiomen creek.
Phoenixville, ...	Montgomery, ...	9,750	Storm drains receive wash water and slops.	Schuylkill river.
Spring City, ...	Montgomery, ...	3,000	Storm drains receive sewage and go into.	River and canal.
Pottstown, ...	Montgomery, ...	15,012	Individual ownership of sewers.	River and tributaries.
Birdsboro, ...	Berks, ...	2,800	Private system, ...	Schuylkill river.
Reading, ...	Berks, ...	92,000	Sewers for sewage only, ...	Disposal plant and river.
Hamburg, ...	Berks, ...	2,418	Storm drains receiving some sewage probably.	Schuylkill river.
Tamaqua, ...	Schuylkill, ...	9,000	Public system, ...	Little Schuylkill river.
Orwigsburg, ...	Schuylkill, ...	1,700	Private system, ...	Small tributary of river.
Schuylkill Haven,	Schuylkill, ...	5,500	Storm drain receives some sewage.	Schuylkill river.
Pottsville, ...	Schuylkill, ...	20,000	Storm drain receives sewage,	Schuylkill river.
Port Carbon, ...	Schuylkill, ...	2,273	Private sewers receive storm water.	Schuylkill river.
Yorkville, ...	Schuylkill, ...	1,250	Sewers receive storm water,	Dyer creek.
Minersville, ...	Schuylkill, ...	5,525	Storm drains receiving sewage.	Dyer creek.
St. Clair, ...	Schuylkill, ...	5,160	Private system, ...	Mill creek.
Frackville, ...	Schuylkill, ...	3,200	Private system, ...	Mill creek.
Lansford and part Summit Hill.	Carbon, ...	6,000	Sewers receive storm water,	Panther creek.

Besides the places appearing in the above table which have water works systems and sewer systems, there are eleven other places, in the Schuylkill river watershed which have water works systems.

They comprise a total population of 17,300 people and are as follows: Sellersville, Boyerstown in Bucks county; Womelsdorf and Fleetwood in Berks county; and Port Clinton, Auburn, Cressona, Mount Carbon and Palo Alto in Schuylkill county.

The municipalities which take their water supply from the river, are Philadelphia, Conshohocken, Norristown, Bridgeport, Phoenixville, Royersford, Spring City, Birdsboro and Pottstown. Reading derives its supply from surface drains and filters a part of the supply. With the exception of Pottstown and Phoenixville and Conshohocken, where there is no attempt to purify the river water, except by sedimentation, the river water is filtered before being supplied to consumers. However, the city of Philadelphia has not yet completed its purification plant, hence not all of the Schuylkill water supplied to the city is subjected to purification. The distance in miles above the city of Philadelphia line of various municipalities along the river are shown in the following table:

Municipalities.	Miles.
Conshohocken,	3
Bridgeport,	6
Norristown,	6
Phoenixville,	15
Spring City,	20
Royersford,	20
Pottstown,	29
Birdsboro,	36
Reading,	47

The typhoid fever rate in Philadelphia is known to be excessively high. The records of typhoid fever cases are not usually reliable. Undoubtedly more cases occur than are recorded. Taking the number of cases reported to the State Department from January first, 1906, to January first, 1907, and expressing them in rates per 100,000 population, it appears that the higher rates occur where crude river water is used without filtration.

Unfiltered river water,	Pottstown,	Rate 233
	Phoenixville,	Rate 574
	Philadelphia,	Rate 579
Filtered river water,	Bridgeport, Norristown, Royersford,	Rate 273
	Spring City,	Rate 66
	Birdsboro,	Rate 71

The Schuylkill river rises in Schuylkill county and takes nearly a direct southerly course to the Delaware river. Its watershed of 1,912 square miles is pear-shaped, being wide at the upper part and narrow in the lower part. From its source to the river mouth, the fall is 800 feet in a distance of 100 miles. Most of this fall is above the city of Reading, which city is 62 miles from the mouth. From Reading to Norristown a distance of 41 miles, the fall is 3½ feet per mile. It is a trifle less from Norristown to the Delaware river.

Below Reading the flow is sluggish at low water—about one mile per hour—but it rapidly increases to four miles or more per hour during freshets.

The largest tributary is the Perkiomen creek which enters the river about eight miles above Norristown after draining a territory to the northeast of about 360 square miles. In its course of 35 miles it falls about 830 feet, is subject to freshets and is known to have delivered its maximum discharge in summer. The watershed is almost wholly in the Triassic shale belt, is a moderate plateau under high cultivation and its torrents transport large quantities of surface soil in form of fine sediment which impart a characteristic reddish yellow color to the stream.

The next tributary of importance, effecting the quality of the Schuylkill River water is the Manatawny creek, which joins the river at Pottstown. It drains a territory of 87 square miles of limestone, slate and shale formation, which formation imparts hardness to the water. The stream also transports sediment of a yellowish color.

The Tulpehocken creek joins the Schuylkill on its west bank opposite Reading. It drains a watershed of limestone and slate formation of 225 square miles in area. The waters are strongly alkaline.

Maiden creek, 6 miles above Reading, is also a strongly alkaline stream. It drains an area from the east of 212 square miles of limestone and slate formation.

Twenty miles above Reading, at the Schuylkill county line, where Port Clinton borough is located, the Schuylkill river forks, the right branch termed Little Schuylkill and the left branch Big Schuylkill river. Their drainage areas are respectively 145 and 208 square miles. Both of these streams drain the coal areas and are, therefore, highly acid.

On the Big Schuylkill are the east and west Schuylkill districts of the southern anthracite coal field, in which are located 47 collieries, 14 boroughs and 15 townships comprising a population of 65,327 census of 1900. On the Little Schuylkill there are 13 collieries, 5 boroughs and 9 townships, with an aggregate population of 28,223 in 1900.

Both branches bring down in suspension quantities of culm and fine pieces of coal which deposit in eddies and where there is slack water. A means of revenue is thus afforded to those who engage in dredging the coal from the beds of the stream. Usually the waters are black on this account to within about 12 miles of Reading. Coal is not dredged from the river below this point, possibly because slack water terminates here. Above this slack water there is known to be a chemical action in the river attributed to the presence of free sulphuric acid, sulphate of iron and aluminum in the water. Changes occur chiefly during dry times or in ordinary stages of the river whereby suspended matters of minute form are coagulated and precipitated to the bottom. During freshets the deposits are scoured out and carried on down the stream.

Ordinarily the appearance of the river water at Reading is clear and of a greenish blue tint. The course of the stream for some distance above Reading is over a limestone ledge. The acidity of the river is partly neutralized here by the carbonate of lime dissolved by the water. This carbonate of lime combines with the sulphate

of iron and the alumina to form a hydrate which coagulates the fine suspended and coloring matter in the river water escaping sedimentation in the pool above, and precipitates it, thereby causing in the 12 miles course to Reading a perceptible clearing up of the stream. Maiden creek with its alkalinity materially aids this clarifying action. The Tulpehocken and smaller streams below Reading, from the limestone belt, bring down more calcium carbonate in solution and these still further reduce the acidity, so that before the waters have reached Pottstown they have become alkaline. It is reported that the river water at Pottstown scales boilers but never corrodes them, which is one practical proof that the acid has become neutralized.

It would be strange indeed if at low stages of the river these various chemical and precipitating influences did not effect a very material diminution in the bacterial content of the river. This chemical precipitation with what purification further goes on in the settling basins of the Pottstown and Phoenixville water works, accounts for the small loss of life in these places where the people drink raw river water.

However, storm flows rapidly change the ordinary condition. The character of the river is variable. Freshets from the coal districts occur every few months, lasting twelve hours or so, during which the river water is black and heavy with dark suspended matter from the coal fields to the Delaware river. This is only when heavy precipitations occur over a large proportion of the coal fields.

It is possible for fresh sewage from the head waters to be brought down in freshet flow to the city of Philadelphia in a period of twenty-four hours or less, and, therefore, the discharge of sewage into the streams anywhere on the watershed is a menace to public health in those municipalities which derive their source of supply from the river.

Delaware Basin Below Philadelphia in Pennsylvania.

Below where the Schuylkill river enters the Delaware river, there is an area of 854 square miles in Pennsylvania within the Delaware river basin. It comprises a part of Philadelphia county and most of Delaware and Chester counties. It is drained by numerous streams of which Darby, Crum, Ridley and Chester creeks empty into the Delaware river within Pennsylvania and by the Brandywine and its tributaries which enter the river at Wilmington, Delaware. In this area there are 1 1-3 cities 26 boroughs and 57 townships whose aggregate population in 1900 was 207,816, divided as follows: 98,681 in the cities, 48,322 in the boroughs and 60,813 in the townships. The major sources of sewage pollution are shown in the following table:

MAJOR POLLUTIONS BELOW PHILADELPHIA IN PENNSYLVANIA.

Municipality.	County.	Pop.	Remarks.	Streams Receiving Sewage.
Norwood,	Delaware,	1,600	Storm drains receive sewage,	Darby creek.
Glenolden,	Delaware,	873	Sewage only,	Darby creek.
Sharon Hill,	Delaware,	1,600	Separate system,	Darby creek.
Colwyn,	Delaware,	1,500	Separate system,	Darby creek.
Darby,	Delaware,	3,676	Sewers receive some storm water.	Darby creek.
Collingdale,	Delaware,	603	Storm drains; sewage excluded.	Darby creek.
Yeadon,	Delaware,	689	Private sewers,	Darby creek.
Aldan,	Delaware,	269	Drains receive sewage,	Darby creek.
Lansdowne,	Delaware,	4,000	Drains supposed to exclude sewage.	Darby creek.
Narberth,	Montgomery,	1,600	Private system,	Tributary Darby creek.
City of Phila.,	Philadelphia,	65,000	Combined system,	Cobbs and Darby creek.
Eddystone,	Delaware,	900	Sewers receive storm water,	Delaware.
Ridley Park,	Delaware,	1,234	Private sewers,	Crum creek.
Rutledge,	Delaware,	500	Combined sewers,	Stony creek.
Swarthmore,	Delaware,	1,700	Combined sewers,	Crum creek.
Chester City,	Delaware,	43,000	Combined sewers,	Delaware.
Upland,	Delaware,	2,300	Private sewers,	Chester creek.
West Chester,	Chester,	11,000	Combined sewers,	Tributary Brandywine.
Downingtown,	Chester,	3,000	Private system,	Brandywine.
Coatesville,	Chester,	6,843	Combined system,	Brandywine.
Parkesburg,	Chester,	2,500	Combined sewers,	Tributary Brandywine.

Besides the above, twenty-two places which have sewer systems and public water works, there are six other places which have public water works systems. They are as follows: Media and Morton in Delaware county, and Avondale, Honey Brook, West Grove and Malvern in Chester county. Chester city and Upland borough are supplied by water which is taken from the Delaware river and subjected to purification in a filter plant. Most of the places in Delaware county are supplied by the Springfield Water Company. The water is taken from Crum creek and mechanically filtered.

The sources of supply to the other municipalities are not known to be seriously contaminated by sewage. Experience of the Department at Scranton, Nanticoke, Butler and Plymouth, all in Pennsylvania, proves conclusively how disastrous may be the consequences of the careless disposal of the dejecta of a single typhoid patient domiciled at some remote point on a watershed from whose surface drains the supply which is ultimately delivered unfiltered to the public. So long as this disease be prevalent in the State, every surface supply whose drainage area is inhabited, is liable to specific infection.

SUMMARY.

The area of the Delaware river basin in Pennsylvania is 6,574 square miles, divided as follows:

	Square Miles.
Delaware river, above Easton,	1,740
Lehigh river watershed,	1,332
Delaware river, between Easton and Philadelphia,	736
Schuylkill river watershed,	1,912
Delaware river, below Philadelphia,	854
Total,	6,574

There are six cities, 138 boroughs and 348 townships in the basin in Pennsylvania. Their locality and population in 1900 appears in the following table:

Delaware river above Easton,	15 boroughs,	24,568	
	57 townships,	54,639	
			79,207
Lehigh river watershed,	2 cities,	67,769	
	29 boroughs,	66,739	
	65 townships,	99,625	
			234,133
Delaware river between Easton and Philadelphia.	⅛ city,	582,165	
	17 boroughs,	24,539	
	38 townships,	56,696	
			663,400
Schuylkill river watershed,	1⅛ city,	725,000	
	51 boroughs,	140,787	
	131 townships,	188,438	
			1,054,225
Delaware river below Philadelphia,	1⅛ city,	98,681	
	26 boroughs,	48,322	
	57 townships,	60,813	
			207,816
			2,238,781

At present there are 6 cities and 96 boroughs which are supplied with public water works systems. The estimated population of these places is 1,874,234, which is 76 per cent. of the estimated population of the entire basin.

At present there are also 6 cities and 60 boroughs which are supplied with public sewers. This estimated population of these places is 1,808,587, which is 73.6 per cent. of the estimated population of the entire basin. A reference to the following tables will show the location of these municipalities:

MUNICIPALITIES BY DISTRICTS HAVING WATER WORKS SYSTEMS.

Delaware river above Easton,	7 boroughs,	22,159
Lehigh river watershed,	3 cities,	164,246
	19 boroughs,	
Delaware river between Easton and Philadelphia.	⅛ city,	629,000
Schuylkill river watershed,	11 boroughs,	
	1⅛ city,	893,951
	33 boroughs,	
Delaware river, below Philadelphia,	1⅛ city,	164,878
	26 boroughs,	
		1,874,234

MUNICIPALITIES BY DISTRICTS HAVING SEWAGE SYSTEMS.

Delaware river, above Easton,	5 boroughs,	15,570
Lehigh river watershed,	3 cities,	141,350
	9 boroughs,	
Delaware river, between Easton and Philadelphia.	⅛ city,	618,028
Schuylkill river watershed,	4 boroughs,	
	1⅛ city,	876,651
	22 boroughs,	
Delaware river, below Philadelphia,	1⅛ city,	156,988
	20 boroughs,	
		1,808,587

DISCUSSION.

Of the places which have filtered water supplies, 3 are cities and 2 are boroughs. With the exception of Chester city, the cities are only partly supplied with filtered water. Their combined population is estimated to be 1,564,400, and the combined population of the 25 boroughs, 105,721, which gives a total of 1,670,171 people supplied

with filtered water. This is 89 per cent. of the total municipal population in the basin having public water works. So it appears that 89 per cent. of the people rely on filtered water taken from a polluted source.

Only four places in the basin have sewage purification work of any size. They are at Palmerton village, Carbon county; Doylestown, Bucks county; Wayne village, Delaware county, and Reading, Berks county. Each is maintained by a private corporation. The Wayne and Reading plants are now under reconstruction, and the others will be overhauled by request of the Department. There are several minor plants in the basin, which are owned by private corporations or individuals.

The great bulk of the sewage goes untreated into the waters of the State. The Commissioner of Health is not clothed with authority to stop all kinds of stream pollution. Mine drainage and tannery wastes are exempted by law. Then, too, the law provides that sewage from a sewer system which was owned and operated by a municipality prior to Act of 1905 may continue to be discharged into any waters of the State. The jurisdiction of the Commissioner begins only when extensions of said system are made. So it is a matter of time only when all public sewer systems will come directly under the supervision of the State Department. However, sewers owned by private corporations or individuals are not thus exempted, and the discharge of sewage from such sewers into any stream must be discontinued forthwith upon notification by the Commissioner of Health to this effect.

During 1906 the Department has been actively engaged in removing individual menaces, particularly on the Schuylkill watershed in Montgomery county. Hundreds of orders have been issued and complied with. In some instances properties have been entered, the menace removed by State officers and the cost thereof placed as a lien on the property. Orders have been issued at Bristol and Pottstown for the discontinuance of private sewers which now discharge into public waters. The borough of Bristol is about to appropriate money to defray the cost of a general sewerage system. Application for sewer extensions have been received from the authorities of Easton, South Bethlehem, Summit Hill, Lansford, Narberth, Lower Merion Township, Sharon Hill, Glenolden, West Chester, Phoenixville, Reading and Yorkville.

Numerous other places have sought the advice of the Department with respect to sewer systems and disposal works. The borough of Norristown has proceeded in defiance of law to materially extend its sewer system and to discharge the sewage therefrom into the Schuylkill river without the approval of the Commissioner of Health.

Permission to extend sewers has been granted to Easton, South Bethlehem, Lansford and West Chester on condition that the sewage be purified in the immediate future; to Narberth and Lower Merion township on condition that the sewage be delivered to the city of Philadelphia's system for the present; and to Sharon Hill and Glenolden on condition that some other disposal of sewage than into the creek shall be adopted when required by the State. The applications of Summit Hill, Phoenixville and Yorkville are pending.

The calls upon the Department from all sections of the State for the removal of menaces on watersheds, coupled with an insufficient appropriation to meet the cost of this work and other work of the Department, has necessarily limited the operations in the Delaware river basin. The future progress of the work also depends upon the amount of money available for the purpose. An enlightened sentiment respecting the importance of protecting the purity of the waters of the State is manifest throughout the Commonwealth and the probabilities are that more work will be done in the Delaware river basin during the ensuing year than was accomplished during the year 1906.

Harrisburg, Pa., February 20, 1907.

IV. FIELD INSPECTION.

There are three distinct kinds of work performed by the field officers.

The first is detail work of stream preservation and is on the upland water sheds sparsely populated and of small area where inspection and patrol can easily prevent the waters of the State from being polluted except, possibly accidentally.

The second is the less particular work on large water sheds whereon may be located villages, towns and cities, the drainage of which goes into a stream subsequently used as a source of a public water supply. The refinements in sanitation readily accepted as practicable for the upland water sheds would be impracticable if enforced on these lower water sheds. In the latter instance two safeguards are necessary, viz.: the diminution of sewage pollution as far as practicable and second, the filtration of the water supply.

The third kind of work of the field officers relates to various insanitary conditions with respect to disposal of household wastes and causes of disease and mortality within or without villages, boroughs and cities more fully mentioned in the heading "General Sanitation."

The improvement of water sheds whose yield is wholly or materially drawn upon for public domestic consumption has demanded and received attention in seventeen instances involving the water supply of seven cities, three boroughs which are county seats, six other boroughs and one village.

Sixteen ice supplies were investigated where the supplies were taken from lakes. The water sheds were inspected and nuisances and menaces removed.

A sanitary survey of the Allegheny river water shed above the city of Pittsburg was begun and partially completed during the year.

Besides this work the drainage areas of eight other streams tributary to the water courses entering the Schuylkill and Delaware rivers in the vicinity but outside of Philadelphia territory were inspected and nuisances detrimental to health were noted and reported.

Improvement of Water Sheds.

There were inspected during the year 1907 properties totalling 22,467 located on 57 different water sheds. Besides this the water supplies at 3,598 places along the railroads were investigated making a grand total of 26,065 properties entered and investigated.

Of the 22,467 properties all were found satisfactory except 4,386. Abatements of nuisances totalling 3,707 were effected on 2,524 of these properties. At the close of the year there were 1,862 properties on which nuisances existed remaining unabated. This was largely due to the fact that the inspections were made in the fall and winter and written orders of abatement had not been served in time for changes to be built before the new year.

The seven cities whose watersheds were inspected are as follows Wilkes-Barre, Scranton, Reading, Lancaster, Lebanon, Johnstown suburbs and Philadelphia suburbs.

Wilkes-Barre watersheds comprise the following streams: Spring Brook, Mill, Gardners, Little Mill and Solomon Creek and Pine, Laurel, Falling Springs and Huntsville runs. On these sheds 444 properties were inspected, on each one a stream pollution was found and abated with one exception, namely, the Turner case. It was placed in the hands of the legal department.

Scranton water sheds comprise Roaring Brook, Lake Scranton and the storage reservoirs at Providence, Dunmore and Williams Bridge as more fully set forth elsewhere in the report under the Scranton epidemic. There were 785 properties inspected, only 57 were in a satisfactory condition and on the 728 estates where stream pollutions existed abatements were effected, totalling 1,098 sources of pollution removed.

Reading water sheds comprise Maiden, Antietam, Burnhart and Egelman creeks. Up to the end of the year the work had not been completed, but 2,666 properties had been visited, 755 of them found unsatisfactory and 23 nuisances removed. Written orders are being prepared for service and the owners of the 732 properties whereon menaces exist will be notified.

The Lancaster water shed comprises that of the Conestoga creek above the city, 8,320 properties were inspected and all but 322 were found in a satisfactory condition. The menaces on 193 estates were abated, leaving 129 properties unchanged at the end of the year. Some of these cases may have to be put in the hands of the legal department.

The Lebanon water shed is drained by the Hammer creek. 310 properties were inspected and all but 52 found in a sanitary condition. On 37 estates there existed 71 stream pollutions which were abated, leaving at the close of the year 15 properties having nuisances still existing.

The Johnstown city suburbs are supplied with water from Salt Lick creek and from Clapboard run. On these areas 76 properties were inspected, 53 were found in an unsatisfactory condition but were made satisfactory, 75 stream pollutions being abated by the end of the year.

The Philadelphia suburbs are partly supplied with water by the Springfield Water Company and the North Springfield Water Company, their supplies coming respectively from Crum Creek and Pick-

ering creek. On these areas 373 properties were inspected and on 78 properties numbering 123 pollutions leaving 53 properties unchanged at the end of the year.

The three boroughs which are county seats whose water sheds were inspected are as follows: Chambersburg, Franklin county; Carlisle, Cumberland county, and Huntingdon, Huntingdon county.

Chambersburg's watershed is drained by the Conocheague. On it 865 properties were inspected and all but 18 were found in a satisfactory condition. At the end of the year 9 pollutions remained unabated.

The Carlisle watershed is drained by the Conedoguinet. On it 3,667 properties were investigated and all but 106 found in a satisfactory condition. Pollutions on 51 properties were abated, leaving 55 unabated pollutions at the end of the year.

The Huntingdon watershed is drained by Standing Stone creek. On it 402 properties were inspected and all but 41 were found satisfactory. 61 pollutions were removed from 31 estates, leaving 10 properties having stream pollutions unchanged at the end of the year.

The six other boroughs whose watersheds were inspected are as follows: Spangler, Catasauqua, Coatesville, Middletown, Manheim and East Mauch Chunk.

On the Spangler watershed there were 244 properties each one having a stream pollution and in some cases more than one pollution. All of the properties were in satisfactory condition at the end of the year, 492 menaces having been removed. See Spangler typhoid epidemic for particulars.

The Catasauqua area, drained by Spring creek, contains 71 properties, 45 of which were satisfactory. The 26 pollutions were not abated at the close of the year because the inspections were made in the winter time.

The Coatesville watersheds are drained by Spring run and Sucker's run. They contain 58 occupied estates on 27 of which pollutions existed. Of these 24 properties having 34 menaces were put in proper condition, leaving 3 unchanged at the end of the year.

The Middletown watershed drained by Iron Mine Run has occupied estates on it. All but one was reported satisfactory and this was abated.

The Manheim watershed was investigated at the time of an outbreak of typhoid fever. 82 occupied estates were found and all but 9 were in a satisfactory condition. On 4 properties only were conditions unchanged at the close of the year.

The East Mauch Chunk watershed drained by Ruddle run contains 5 properties which are occupied. They contain pollutions which were abated with one exception and this is in the hands of the legal department.

Factoryville village, now a borough, is in Wyoming county near Scranton. Lake Sheridan and Baylors Pond are the sources of supply. On their watersheds there are 79 occupied estates on 42 of which 75 pollutions were found. Abatements have been effected before the close of the year.

The following table gives the name of each of the 16 ice supplies investigated, the number of occupied properties on each watershed, the number of such properties found in a satisfactory condition and

the number found to contain pollutions. Under the abatements the first column gives the number of occupied estates on which nuisances were removed and the next column shows the number of pollutions on these properties. The last column gives the number of estates remaining unchanged with respect to menaces at the close of the year.

It will be noted that 687 properties on the watersheds of the ice supplies were inspected and that 260 of them contained water pollutions. All but 12 of these estates were satisfactory at the end of the year. On the 248 estates made satisfactory there were removed 318 pollutions.

WATER SHED OF ICE SUPPLIES.

	Occupied Properties on Watershed.			Abatements.		
	Total.	Satisfactory.	Stream menace.	Estate.	Pollutions.	Properties unchanged.
Lake Winola,	113	68	45	45	47	.....
Lake Ariel,	57	9	48	48	61	.....
Maplewood,	29	9	20	20	22	.....
Five Mile pond,	3	3	.....	.....	.....	.....
Heart lake,	30	21	9	9	9	.....
Warrenton lake,	109	56	53	48	60	5
Lake Ladore, Lake Keene,	199	150	49	49	72	.....
Summit lake,	12	10	2	2	5	.....
West End, North Jersey, Watango,	102	83	19	19	24	.....
Haughey lake,	2	1	1	1	1	.....
Lynch lake,	1	1	.....	.....	.....	.....
Lake No. 2,	2	2	.....	.....	.....	.....
Lake No. 1,	28	14	14	7	17	7
	687	427	260	248	318	12

The less particular work on water sheds involved the drainage areas of the following streams outside of the city of Philadelphia territory:

	Occupied Properties on Watershed.			Abatements.		
	Total.	Satisfactory.	Stream menace.	Estate.	Pollutions.	Properties unchanged.
Gulf creek,	140	112	28	13	14	15
Ithan creek,	797	658	129	126	166	13
Pennypack creek,	325	207	118	.....	.....	118
Tacony,	752	316	436	.....	.....	436
Wissahickon,	1,022	836	186	120	120	66
Brandywine creek at Barnardstown,	19	4	15	4	4	11
Rock run,	154	24	130	47	168	83
Quittapahilla at Lebanon,	70	70	70	.....	.....	70
	3,279	2,157	1,122	310	472	812

The written orders for abatement relative to the Pennypack and Tacony watersheds will be served during the winter. The pollutions at Lebanon were within the city. The question of a general system for that place is being discussed.

General Sanitation.

Some industrial pollutions cannot be classed as sewage pollutions under the law. They may bring about a very unsanitary condition in a natural water course requiring to be abated on the score of a common nuisance.

Pollution of the ground water supply by sewage from a village or town or any other source is a matter for investigation and action by the State Department of Health. The Commissioner of Health is charged with the preservation of the purity of such waters in the interests of public health. All such work done by field officers which has to deal with the disposal of sewage in villages and towns comes more particularly under the work of municipal sanitation. In many villages and hamlets throughout the State general practices respecting disposal of household wastes are insanitary and possibly the cause of disease and mortality. These subjects are properly investigated by the Department of Health since there is no other body having jurisdiction in the fifteen hundred townships wherein reside about one-third of the population of the Commonwealth. This class of work is distinct from other field office work and is treated under the head of General Sanitation.

The sanitary survey of the Allegheny river watershed about Pittsburg involved examinations in 137 boroughs three cities, 27 villages and one first-class township. 61,355 properties were examined and 13,290 sources of stream pollution were noted. Within the city, borough, village and township the remedy of the various nuisances in the streams, the pollution of public ground water supply and general unsanitary respecting disposal of household wastes and causes of disease and mortality is found quite often to be a public sewerage system. Considerable time must be allowed naturally for the discussion of the introduction of such an improvement and for the inauguration of a sewer system. Therefore, it is not reasonable to expect immediate abatements of these thousands of pollutions within the municipalities. However, the sanitary survey forms a basis upon which to make a beginning.

The following table gives a summary of the survey: On the entire Allegheny river watershed and on a part of the Monongahela. Also a survey in the boroughs of Sharon and South Sharon on the Shenango river and of all of the boroughs on Penns creek which stream affords the source of supply to Selins Grove.

SUMMARY OF SANITARY SURVEY ON CERTAIN WATERSHEDS.

County.	Borough.	City.	Village.	Properties.	Pollutions.
Allegheny,	7	.....	1	5,550	495
Armstrong,	15	1	1	5,434	699
Butler,	6	.....	.....	755	234
Cambria,	13	.....	6	5,485	2,117
Clarion,	10	.....	.....	1,935	337
Clearfield,	3	.....	.....	3,295	315
Crawford,	12	.....	.....	1,138	107
Elk,	2	.....	.....	2,800	1,519
Erie,	6	1	.....	3,320	336
Forest,	1	.....	.....	10	27
Indiana,	9	.....	12	4,231	1,916
Jefferson,	10	.....	4	6,305	1,431
Mercer,	4	.....	.....	445	85
McKean,	5	1	.....	8,100	804
Potter,	1	.....	.....	900	319
Somerset,	6	.....	2	2,430	1,116
Venango,	8	.....	.....	1,385	297
Warren,	6	.....	.....	1,020	134
Westmoreland,	13	.....	2	6,567	1,002
19	137	3	28	61,355	13,290
On the Monongahela Watershed.					
Allegheny,	9	1	1	27,155	3,196
On the Shenango Watershed.					
Mercer,	2	.....	.....	3,400	332
On Penns Creek Watershed.					
Union,	4	.....	.....	420	57
	152	4	29	92,330	16,875

The above four sanitary surveys were made under the immediate direction of Mr. James M. Clark who had charge of the field force. Mr. Clark also superintended the inspection of 17 public institutions on the Allegheny water shed as follows:

Kittanning General Hospital,
Armstrong County Almshouse near Kittanning,
Jefferson County Almshouse near Brookville,
Home for Disabled Soldiers and Their Wives, at Brookville,
Adrian Hospital, at Punxsutawney,
Clarion County Almshouse,
State Normal School, at Clarion,
Forrest County Almshouse, near Tionesta,
Crawford County Almshouse, at Saegertown,
Bradford General Hospital,
McKean County Almshouse,
Bradford City Poor Farm,
Kane Summit Hospital,
Potter County Almshouse, at Coudersport,
Elk County General Hospital, at Ridgway,
Cambria County Almshouse, near Ebensburg.

Water Sample Collection.

Samples of water used as sources of public supply or for private drinking purposes have been collected at 148 places throughout the State and sent for bacteriological examination to the Department's

laboratories at the University of Pennsylvania. Twenty-one hundred and nineteen of these samples were collected in 11 places as follows: 703 samples at Scranton, 712 samples at Mt. Gretna and in the vicinity in the Conewago Valley, part being shipped from Lawn and part from Mt. Gretna Station, 341 samples from Kittanning, 131 samples from Ridgway, 69 samples from Harrisburg, 51 samples from Johnstown, 47 samples from Devon, 28 samples from Franklin, 21 samples from Oil City and 16 samples from Corry. The balance of the total number of samples were sent in from 137 places widely scattered.

Seventeen hundred of the samples examined were collected by officers of the Engineering Division of the Department. The greatest number of samples sent in, in any one month was 440 for September, the next was 376 samples in July followed by 357 samples in August. Wilson W. Ritter made 631 collections during the year, Daniel Zellers made 222 collections, Edward Workman 192, C. H. Cummings 169, R. E. Irwin 168 and John Sheaffer 158 collections.

36—16—1907

V. EPIDEMICS.

The epidemics of a water-borne character where public water works systems were involved have received the attention of the Engineering Division by direction of the Commissioner of Health in nine instances, as follows: Burnham, Conemaugh and Franklin, Corry, Huntingdon, Kittanning, Manheim, Ridgway, Scranton and Spangler.

TYPHOID EPIDEMIC AT SCRANTON.

On December 7th, 1906, it was ascertained and made public through the Scranton Times, a newspaper published daily in the city of Scranton, Lackawanna county, Pennsylvania, that there were 67 cases of typhoid fever in the city although the public records showed but 8 cases reported at the Bureau of Health of the city. It rapidly transpired on investigation and by new cases reported, that an incipient typhoid fever epidemic was present in the community, and on December 14th its proportion had reached such an alarming extent that the Mayor called upon the Commissioner of Health of Pennsylvania for assistance. The city was not ready to give over the entire charge to the State Department of Health of the conduct of matters pertaining to the suppression of the disease within the city, and in consequence the assistant Medical Inspector and the Assistant Engineer were sent from Harrisburg to Scranton to investigate the cause of the outbreak and to render such advisory assistance to the local authorities as could be readily given. These State officers arrived in Scranton on December 15th and at once began an exploration of the water-shed of the Roaring Brook supply which appeared to be the medium for the transmission of the disease. Daily developments confirmed the early conviction that the epidemic was water-borne and must have come from the Roaring Brook supply.

Untiring efforts on the part of the State officers to run down the source of infection proved fruitless, although every rumor, of which there were many, was followed out to a conclusion. Chief menaces on the water-shed were enumerated and verbal orders given for abatement. Samples of water were taken from the varous sources of supply to the public in the city and these samples were sent to the State Department of Health's Laboratories at the University of Pennsylvania at Philadelphia for bacteriological examination. Corporations outside of the city limits furnishing water to their employees were ordered to take precautionary measures. Within the city limits such things were done and orders issued as the Mayor thought advisable after consultation with the State Officers, with heads of city departments and with professional men in the city.

By the last of December, in spite of all that had been done, the epidemic gave no evidence of diminution but on the contrary was spreading. The Commissioner of Health deemed it expedient to send Chief Medical Inspector and the Chief Engineer of the State Department of Health to Scranton to carry out specific instructions. Dr. Frederick C. Johnson, the Chief Medical Inspector and Chief Engineer Snow arrived in Scranton on the morning of January 1st, 1907. That afternoon announcement was made through the columns of the public press that the Commissioner of Health of Pennsylvania had assumed full responsibility, charge and control of all sources of water supply to the public in the city and vicinity. Furthermore, written orders issued by the Commissioner of Health upon that day relative to the sanitary protection of the sources of supply of water to Scranton were published.

On January 2nd, the Commissioner of Health's instructions to the Scranton Gas and Water Company not to use certain sources of supply until a written permit was issued therefor by the Commissioner of Health were delivered to the President of the Water Company.

On January 4th an announcement was made to the public through the columns of the press and over the Commissioner of Health's signature, that the Roaring Brook supply had been found to be polluted by sewage and that the typhoid baccilli had been found in water works system.

On January 5th, full preparations having been made in the meantime, a force of inspectors were set to work in the water sheds of the company to carry out the provision of the orders issued by the Commissioner of Health on January 1st relative to the abatement of nuisances and for the sanitary protection of the sources of supply. Persistent rumors as to the possible origin of the infection were run down. Copper sulphate treatment of the waters being supplied

to the city from Lake Scranton was given. The doors on the closets of railroad trains passing over the Roaring Brook water-shed were closed and placarded. The placard announced that this closing was done by request of the Commissioner of Health. Plans for a sewage disposal plant for the hotel at Moscow were prepared by the engineers of the Department and the works were constructed by the water company.

Daily consultation with the Mayor, Honorable Benjamin Dimmick was had. Suggestions were given over the telephone by the Commissioner of Health as to the nature of preventative measures in the city.

Nevertheless this and all the precautions did not effect any marked decline in the epidemic or warrant sanguine anticipation as to the number of people affected by the original infection until about the 12th of January.

Undoubtedly the cold weather aided in the fight against secondary cases.

It appears that the city of Scranton had never before been visited by a typhoid epidemic. The sources of supply had always been considered superior in quality to that of most other municipalities in the country. The sudden onslaught during the close of 1906 was a great surprise to the water company officials and to the public in general. The tardiness of physicians in reporting cases renders unreliable for close calculation the exact period of infection. Judging from information obtained, the disease began to manifest itself about the first of December.

On November 15th a heavy fall of snow occurred in the north-eastern section of Pennsylvania followed two days later by three days of rainfall with high temperature resulting in a complete disappearance of the snow and a small freshet. The high tide or run-off from the water-shed was observed to occur on November 21st, and about ten days later the first cases began to appear and twenty days thereafter the epidemic was manifest and thirty days after November 21st the full force of the outbreak was upon the community. During these periods Elmhurst Reservoir water was being supplied directly to the city through a 30 inch pipe line. This reservoir holds a large amount of water and any infection that entered it at the upper end would require several days in passing through. Some of it was delayed ten days or two weeks in passing. This time, plus the periods of from ten to twenty days for the incubation, about corresponds with the first appearance, then the increase, and finally the maximum onset of the epidemic. The Elmhurst water was not shut off from the main until December 15th, and the flushing of the mains and dead ends was not completed until December 20th, and some of the poison even then, (if it came from Elmhurst reservoir) might have been lurking in the water mains so that primary cases from the original infection might have been expected as late as January 15th and a few cases of long incubation periods even after this date.

By recourse to records it is seen that this follows closely what actually happened, always bearing in mind that the dates of the cases when reported by the physicians may have been two weeks behind time.

TYPHOID CASES AS REPORTED BY PHYSICIANS TO THE LOCAL HEALTH BUREAU.

Day of Month.	December.		January.		February.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1,	0	.....	37	5	1	1
2,	0	.....	22	3	1	.....
3,	5	.....	31	5	0	.....
4,	0	.....	11	3	2	.....
5,	2	.....	29	4	4	2
6,	4	.....	5	2	1	.....
7,	3	.....	9	2	2	.....
8,	0	.....	19	3	0	.....
9,	0	1	16	2	0	.....
10,	5	1	9	2	0	.....
11,	6	.....	8	3	5	.....
12,	24	.....	8	4	0	.....
13,	10	.....	7	.....	0	1
14,	22	.....	7	4	0	1
15,	33	2	8	.....	2	1
16,	22	2	7	1	2	1
17,	49	2	1	1	5	.....
18,	54	1	8	3	1	.....
19,	48	.....	7	2	1	.....
20,	68	2	6	1	1	.....
21,	82	1	5	2	0	.....
22,	45	1	4	1	0	.....
23,	36	.....	3	.....	0	1
24,	23	3	7	1	0	.....
25,	39	2	7	2	1	.....
26,	35	6	4	1	0	.....
27,	37	2	0	.....	0	.....
28,	49	5	4	1	1	.....
29,	50	5	4	2	.....	.....
30,	53	4	2	1	.....	.....
31,	49	6	4	.....	.....	.....
Total,	853	46	299	61	30	8

The totals of the above table do not compare with the returns at the office of the Bureau of Vital Statistics of the Department. Such returns show the following result:

	Cases.	Deaths.
December,	880	49
January,	263	65
February,	28	9
	1,171	123

The line of demarkation between the districts afflicted and non-afflicted followed closely the boundary lines between the districts supplied with Elmhurst water and those not so supplied. This fact was apparent early in the epidemic and led the city officials to conclude that the water supply from the Elmhurst reservoir was the source of the trouble. This surmise was confirmed by the researches of the State Department.

The chief work of the Engineering Division of the State Department of Health was confined to the field outside of the city limits beyond the jurisdiction of the city of Scranton. Here the Commissioner of Health assumed full control and here the most important work was done with respect to permanently safeguarding the public against a re-occurrence of infection of the sources of supply.

The following is a copy of an order issued by the Commissioner of Health, published in the newspapers and printed on placards and posted at prominent places and on every occupied estate throughout the water-sheds of the Scranton Gas and Water Company. This placard was printed in the Italian, Polish, Slavish and English language.

COMMONWEALTH OF PENNSYLVANIA,

DEPARTMENT OF HEALTH.

An order issued by the Commissioner of Health of the State of Pennsylvania for the sanitary protection of the waters used by the Scranton Gas and Water Company for the supply of water to the public in the city of Scranton and its immediate vicinity.

Section 1. No cesspool, privy or other place of reception deposit, or storage of human excrement, and no urinal or water closet shall be located, constructed or maintained within 50 feet of the high water mark of any lake, pond, reservoir, stream, ditch, water course, or other open waters used by the Scranton Gas and Water Company, as a source, or for the conveyance, storage or distribution of the water supply of the city of Scranton or its immediate vicinity, or within 50 feet of the high water mark of any lake, pond, reservoir, stream, ditch water course, or other open waters, the waters of which flows directly or ultimately into any waters so used by the Scranton Gas and Water Company.

Section 2. No human excrement shall be deposited or discharged in or into any lake, pond, reservoir, stream, ditch, water course, or other open waters, used either directly or indirectly by the Scranton Gas and Water Company, for the supply of water to the public in the city of Scranton or its vicinity; and no human excrement shall be kept in, deposited to discharged in or into any cesspool, privy, or other receptacle, situated within 250 feet of the high water mark of any open waters so used directly or indirectly by the Scranton Gas and Water Company unless such cesspool, privy, or receptacle is so constructed that no portion of its contents shall escape or be washed into any such waters.

Section 3. No human excrement, or compost containing human excrement or contents of any privy, or cesspool or sewer, or other receptacle for the reception or storage of human excrement, shall be deposited or discharged upon or into the ground at any place from which any such excrement, compost or contents, or particles thereof, may flow, or be washed or carried into any lake, pond, reservoir, stream, ditch, water course or other open waters used by the Scranton Gas and Water Company, as a source, or for the conveyance of, storage or distribution of the water supply of the city of Scranton, or its immediate vicinity, or into any of such waters of the State, the water of which flows directly or ultimately into any waters so used by the Scranton Gas and Water Company.

Section 4. No house slops, sink wastes, water which has been used for washing or cooking or other polluted water, shall be discharged directly or indirectly into any lake, pond, reservoir, stream, ditch, water course, or other open waters used by the Scranton Gas and Water Company as a source, or for the conveyance, storage or distribution of the water supply of the city of Scranton, or its immediate vicinity, or into any such waters of the State, the water of which flows directly or ultimately into any waters so used by the said water company; no house slop, sink water, water which has been used for washing or cooking or other polluted water shall be discharged into the ground within 50 feet of the high water mark of any open waters so used by the said company, or of any open waters flowing as aforesaid into the waters so used by the said company, and not then, unless such dischage into the grounds is so arranged that no portion of it can escape to the surface of the ground and be washed into any such waters.

Section 5. No garbage, manure or putrescible matter, whatsoever, shall be put into any lake, pond, reservoir, stream, ditch, water course, or other open waters used by the Scranton Gas and Water Company, as a source or for the conveyance storage, or distribution of the water supply of the city of Scranton and its immediate vicinity, or into any such waters of the State, the waters of which flows directly or ultimately into any waters so used by the said water company; and no garbage, manure, or putresible matter whatsoever, shall, except in the cultivation of and use of the soil, in the ordinary method of agriculture, to put upon the ground within 250 feet of the high water mark of any open waters so used by the said water company, or of any open waters indirectly so used by the said company, nor on said ground beyond said limits, unless precautions are taken that prevent any portion of such matter to escape or be washed into any such waters.

Section 6. No stable, pig sty, hen house, hog yard, barnyard, hitching or standing place for horses, cattle or other animals, or other places where animal manure is deposited or accumulates shall be located, constructed or maintained, any part of which is within 50 feet of the high water mark of any lake, pond, reservoir, stream, ditch, water course or other open waters used by the Scranton Gas and Water Company, as a source, or for the conveyance, storage or

distribution of the water supply for the city of Scranton or its vicinity, or the waters of the State, the waters of which flow directly or ultimately into any waters so used by the said water company, and no stable, or other place as above enumerated, shall be located, constructed or maintained on any ground, the surface drainage of which is either directly or indirectly into the aforesaid waters so used by the said water company, unless suitable and adequate provisions are made to prevent any manure or other polluted matter from flowing or washing into such open waters.

Section 7. No manufacturing refuse, or waste products, or polluting liquid or other substance of a nature poisonous either to human beings or animals, or other putrescible organic matter whatsoever, shall be discharged, directly or indirectly into or from any place from which it may flow or be washed or carried into any of the open waters of the State used by the Scranton Gas and Water Company, as a source of supply to the public, or for conveyance, storage or distribution of the water supply of the city of Scranton and its vicinity.

Issued January 1st, 1907, and to remain in force until further order.

SAMUEL G. DIXON,
Commissioner of Health.

The following is a sample of a placard printed in four languages mentioned above and posted on the water-sheds of the Scranton Gas and Water Company.

WARNING.

Any person committing a nuisance or depositing sewage, garbage or other matter on these premises or in any stream, dam or lake, will be subject to the penalty of the law.

SAMUEL G. DIXON,
Commissioner of Health,
Commonwealth of Pennsylvania.

The water works are owned and operated by the Scranton Gas and Water Company. The supply is by gravity and is obtained from seven storage and eight distributing reservoirs located in the city and outside of the city within a radius of 12 miles. The elevation of the lowest distributing reservoir is 922 feet above mean sea level and the elevation of the highest storage reservoir is 1,905 feet above mean sea level. The average elevation of the business section of Scranton is 750. Owing to the rugged topography there are two low and one high services in the vicinity.

The Roaring Brook water-shed of about 50 square miles above reservoir number 7 is the principal source. Leggett Creek is the next important.

The former flows in a general north-westerly direction to the Lackawanna River in the city and Leggett Creek flows in a general south-easterly direction and enters the river in the city.

On Roaring Brook is Lake Henry, Oak Run and Elmhurst reservoir, named in order down stream and also reservoir number 7 from which the supply pipes lead into the town. On this water-shed further down is Dunmore reservoir which may be used to furnish water to the city.

On Stafford Meadow Brook, a stream paralleling and west of Roaring Brook is Williams Bridge reservoir, Lake Scranton and distributing reservoir number 5.

On Leggett Creek are Summit reservoir and Griffin reservoir, storage basins from which water is delivered to three distributing reservoirs on the Providence low service district in the city.

The Williams Bridge supply is distributed through No. 6 reservoir into the city high service. The Elmhurst and Lake Scranton and Roaring Brook waters are distributed through No. 7 to the main low service district. A part of this low service district is supplied from distributing reservoir No. 5.

The average pressure over the entire city is about 78 pounds, the maximum is 160 pounds and the minimum 15 pounds. The total daily consumption from all sources averages about 25,000,000 gallons daily. The estimated population is 120,000 being equivalent to a per capita consumption of 208 gallons. The consumption on the high service where there are no industries is 143 gallons and in the low service district 225 gallons. The maximum consumption occurs in the winter months and is approximately 30,000,000 gallons each 24 hours. There are no water meters installed for general use. There are said to be 775 meters in use by large consumers.

The water-shed of No. 7 reservoir is 50 square miles, 13 of which are below the Elmhurst reservoir. On the 13 square miles is a population of 720 people residing on 165 properties located in Elmhurst borough, a part of Dunmore borough. Roaring Brook and Jefferson townships. The 37 square miles of Elmhurst reservoir water-shed contain a population of 1,159 living on 348 properties located in Roaring Brook, Jefferson, Madison, Covington and Spring Brook townships, Lackawanna county, including the villages of Moscow, Daleville and Freytown.

The distribution of the population on the Roaring Brook water-shed is shown in the folowing table:

ROARING BROOK WATER-SHED POPULATION.

	Properties.	Population.
Boroughs:		
Elmhurst,	101	440
Dunmore,	11	46
Villages:		
Nay Aug,	35	178
Daleville,	14	42
Freytown,	7	28
Moscow,	125	454
Townships:		
Covington, ...		
Madison, ...		
Jefferson, ...	220	691
Spring Brook, .		
Roaring Brook,		
	513	1,879

Besides the two boroughs the village of Nay Aug and 18 properties on which reside 56 people, including parts of Roaring Brook and Jefferson Townships, are including in the 13 square miles of water-shed tributary to reservoir No. 7 below Elmhurst reservoir.

The work of field inspection in this report is divided into two parts, namely, that done under the personal direction of the Chief Engineer while on the ground during the typhoid fever epidemic, January 1st to February 7th inclusive, and the performed after February 7th up to November 27th of the same year under the direction of Chief Inspector, M. K. Ely.

Inspectors Ely, Clark, Considine, Nightingale, Teats, Ritter, Coleman, Zellers, Kauffman, Truitt and Avery comprised the force of field inspectors engaged in the work during the month of January. Their duties were arduous and were discharged willingly, regardless of exacting hours, low temperature and inclement weather of a severe kind.

During the five weeks, with the thermometer below zero much of the time every occupied estate on the water-shed was inspected and only a few were found in a satisfactory condition with respect to stream pollution. Written notices of abatement were served in 137 instances on the water-shed of No. 7 reservoir. Thirty-two privies were removed from the banks of water courses and placed over masonry vaults constructed for the purpose. Thirty-six privies, remote from streams, were cleaned and disinfected. Twenty-six cesspools of the percolating type were constructed. Two barns and stables were moved back from the stream. Ten manure piles were removed to a point where the drainage would not reach the water course. Five pigpens were cleaned and two removed to high ground. One sewer was discontinued. Eleven chicken houses were moved back from the stream and the yards cleaned and four others were changed in location.

On the water-shed of Elmhurst reservoir comprising thirty-seven square miles, during the five weeks of the epidemic from January 1st to February 7th, 210 written notices of abatement were served, 153 privies were removed from the banks of water courses and placed over masonry vaults constructed for the purpose and forty-seven privies were cleaned and disinfected. Forty-eight percolating cesspools were constructed, one barn was moved back from the stream and eleven manure piles.

Four pigpens were cleaned and seven removed. Three sewers were discontinued and a sewage purification plant was built for the Moscow Hotel. Two chicken houses were removed and a slaughter house was remodeled and the drainage therefrom to the stream was stopped. Several private sewers to the sewage disposal plant were constructed. Only nineteen properties on the thirty-seven square miles were found satisfactory. The sewage disposal plant at Moscow comprised a sewer, septic tank and a sand filter. The plans were drawn by the engineers of the division.

These changes were prosecuted during severe weather. Subsequently every occupied estate on the water-shed was provided with a suitable means for disposing of sewage.

The following table shows the work done during the year on the entire Roaring Brook water-shed of fifty square miles:

IMPROVED SANITATION WORK.

Roaring Brook Water-shed fifty square miles for Year, 1907.

Total population, 1,879. Occupied properties, 513.

Privies cleaned and disinfected,	101
Privies moved and vaults constructed,	347
Cesspools constructed,	165
Barns and stables removed,	11
Barnyard drainage changed,	5
Manure piles removed,	23
Manure vaults constructed,	12
Pigpens cleaned,	9
Pigpens removed,	24
Dwellings removed,	8
Chicken houses removed,	9
House sewers discontinued,	8
Chicken houses and yards cleaned,	11
Streams changed,	22
Swamps drained,	4
Creameries remodeled and drainage to stream stopped,	3
Water courses cleaned,	4
Slaughter houses remodeled and drainage to stream stopped,	2
Slaughter houses removed,	2
Disposal plant constructed,	1
Sewage disposal plant connections,	15
Properties found satisfactory,	29
Verbal notices of abatement,	47
Written notices served,	466
Total number of changes,	783

All of this work and that on the other water-shed of the Scranton Gas and Water Company involving several thousand dollars expenditure was done under the direction of the engineers and inspectors of the State Department of Health by and at the expense, (with a few exceptions) of the water company.

On the Dunmore water-shed there are forty-one properties and a resident population of 204. Only four properties were found in a satisfactory condition. On Lake Scranton water-shed there are five properties and a population of fourteen. On the Williams Bridge water-shed there were thirteen properties and a pouplation of thirty-five. On the Leggett Creek water-shed were 113 properties and a population of 410.

The following table shows the work performed on these water-sheds during the year:

Leggett Creek,	156	changes
Dunmore,	125	"
Lake Scranton,	13	"
Williams Bridge,	21	"
Total,	315	changes

The State has maintained a sanitary patrol of these water-sheds and the water company has also established and maintained a sanitary patrol of its own. The city has had an inspection made from time to time. It has also made periodical tests of the water.

The water company has equipped a chemical and bacteriological laboratory at its own expense and has employed a competent and skilled analyst who devotes his whole time to the work of collecting samples and making daily examinations of the various waters.

The State Department of Health has for many months kept a man in the field collecting samples of water supplied by the Scranton Gas and Water Company to the public. These samples were analyzed by the Department's laboratories at the University of Pennsylvania.

TYPHOID FEVER AT HUNTINGDON.

On January 21st, 1907, the Board of Health of Huntingdon, Pennsylvania requested the State Department of Health to make a thorough examination of the water supply, filter plant, and works of the system supplying water to the

borough with the view of ascertaining whether the presence of typhoid fever in Huntingdon was due to said water supply. At that time there were reported seventeen cases in the town. The Department inspected the water works system and the water-shed and ordered an abatement of stream pollutions. The following report describes in detail what was done.

LOCATION.

The borough of Huntingdon the county seat of Huntingdon county is located near the center of the county on the east bank of the Juniata River. It is bounded on the north and east by Oneida township and on the south by Henderson township, from which it is separated for a portion of its southern boundery by Standing Stone Creek which enters the Juniata River at the southern extremity of the borough. The portion of the town known as Portstown is subject to overflow during high water.

GENERAL DESCRIPTION.

The town was incorporated in 1787. It has a present population of about 7,200, in 1900 it was 6,063, in 1890 it was 5,729, and in 1880 it was 4,125.

The borough is located on rising ground along the river, the built up portion being about 1.6 miles in length and 0.3 miles in width having an area of about 775 acres. The business portion is principally in the southern half of the town along the river.

The main line of the Pennsylvania Railroad passes through the town along the east bank of the Juniata River. The Huntingdon and Broad Top Mountain Railroad connects with the Pennsylvania Railroad here, the other terminus being in Mt. Dallas where it connects with the Baltimore and Ohio Railroad.

Immediately across the river, opposite the northerly end of the borough in Smithfield township, is located the Huntingdon Industrial Reformatory, a State Institution containing 760 inmates.

Near the reformatory and along the line of the Huntingdon and Broad Top Railroad, there is a village known as Smithfield, containing about fifty houses and the yards of the Huntingdon and Broad Top Railroad.

The principal industries of the borough are the Blair Stationery Company employing 250 hands, the King Book Bindery employing forty hands, the Huntingdon Knitting Factory employing forty hands, Westbrook Ice Cream Factory employing six hands and Montgomery's Ice Cream Factory employing six hands. Juniata College located at Moore and Seventeenth streets has about 400 pupils. All the above mentioned properties are supplied by the water company.

There are also numerous railroad employes stationed at Huntingdon it being the headquarters of the Huntingdon and Broad Top Mountain Railroad.

The Pennsylvania Railroad Company has a small pumping station at Portstown for pumping river water to tanks at Penn and Tenth streets, used to supply locomotives and fire service and therefore liable to be used for drinking purposes. Tanks of passenger coaches are filled at Altoona. The passenger and freight station are suplied by the water company. The Huntingdon and Broad Top Mountain Railroad is supplied by the water company.

The borough has an assessed valuation of $1,800,000 and a bonded debt of about $21,000. There are about two miles of brick paved streets. A local trolley system furnishes communication between different portions of the borough but there are no connections with surrounding towns, although a line has been projected to Mt. Union.

DRAINAGE AND SEWERAGE.

The natural drainage of the borough is good being directly into the river, into Standing Stone Creek or Muddy Run. Muddy Run rises in Oneida township and flows south-westerly through the borough entering the river at Seventh street near the center of the borough. It has a length of about two miles about two-thirds of which are within the borough limits, the last 4,000 feet being through the built up portion and covered in various ways. It has a drainage area of about 1,000 acres. This system is badly polluted by public and private sewers, the principal dry weather flow being sewage.

In April, 1906, the first steps was taken towards obviating this nuisance and at present the borough is constructing a system of sanitary sewers which will consist of ten inch to twenty-two inch pipe to be about ten miles in length. The question of sewage disposal is also being studied with a view of construction when the finances of the borough will warrant it.

The Juniata River rises in Blair county about forty-two miles above Huntingdon and flows in a general easterly direction emptying into the Susquehanna River about fifteen miles above Harrisburg and ninety-five miles below Huntingdon. It has a drainage area of about 3,400 square miles, 855 of which are above Huntingdon with a dry weather flow of about 110 cubic feet per second at Huntingdon. About three miles above Huntingdon is the power plant of the

Juniata Hydro-Electric Company which furnished electricity in the borough for lighting and manufacturing purposes. Just above this plant is that of the Wilson Electric Company which furnishes power to the borough for trolley cars and other purposes.

WATER WORKS.

The works which supply the borough with water were built in 1885 by the Huntingdon Water Company, Limited, a concern which was never chartered. This system consisted of a pumping station located at Washington near Second street about 900 feet north of Standing Stone Creek taking its supply through a twelve inch C. I. pjipe from a crib dam across the creek about 900 feet above its mouth. The water was pumped to a small reservoir located on an extension of Fifth street about 120 vertical feet above the creek, having a capacity of about two million gallons.

On October 4th, 1900, a perpetual charter was granted to the Huntingdon Water Supply Company, Wm. Walker, President, and Frank R. Stocker, Secretary, to supply the borough of Huntingdon with water. This company acquired the works and property of the Huntingdon Water Company, Limited. On November 30th, 1906, the company applied to the Department of Health to extend its mains across the river into Smithfield township for the purpose of supplying the fifty houses there. This pipe was laid before the inspection for the permit was made and no action was taken at that time. The company was granted permission by the Secretary of State to extend its mains on December 6th, 1906, to a territory bounded northerly by the Juniata River and the borough of Huntingdon, easterly by the right of way of the Huntingdon and Broad Top Mountain Railroad southerly by the Pennsylvania Industrial Reformatory siding and westerly by the lands of the Pennsylvania Industrial Reformatory.

In 1898 a new reservoir was constructed and in 1900 a system of Maignen filters were installed.

SOURCE OF SUPPLY.

The present source of supply is Standing Stone Creek, rising in Jackson township in the eastern portion of Huntingdon county and flowing in a westerly direction into the Juniata River. This stream has a length of about 22.5 miles and drainage area of about 115 square miles including Oneida, Henderson, Miller, and a portion of Barree and Jackson townships.

The water shed is about evenly divided between farming and woodland with a few small villages among which are Donation, Cornpropst Mill, Ennisville, McAlveys Fort and Greenwood Furnace.

The soil is shaley and the rock principally sandstone.

In April 1907 the State Department of Health made a preliminary inspection of this water-shed and located twenty pollutions for whose removal notices of abatement were issued.

Between September 15th to October 10th, 1907 a final inspection by Field Officers of the Department was made of this water-shed. On the drainage area is located the following townships: Jackson, Miller, Oneida, and parts of Henderson, West Logan and Barre, all in Huntingdon county, Pennsylvania. The total population comprising 1,293 human beings, 649 horses, 1,006 cattle and 645 pigs all of 402 occupied estates.

There has been five cases of typhoid fever on this water-shed during the last ten years. Of the 402 occupied estates 361 properties were found satisfactory and forty-one properties were found unsatisfactory, forty-one written notices of abatement served and at the close of the year thirty-four abatements had been effected. The pollutions consisted of twenty-nine privies and cesspools, twenty-three stables and pigpens, six by kitchen waste and wash water, one dead animal in the stream, one pollution by industrial waste and one pollution by bath, closet and kitchen waste.

Near Ennisville the creek flows through a limestone belt. The clay soil in this belt is the source of a large amount of the cloudiness occuring in the water of the creek after a rain.

Weir measurements are reported to show less water in the stream below this belt than above it. This loss of water is caused by sink holes and underground streams which follow this belt of the Juniata River discharging in the form of large springs several miles above Huntingdon.

DAM AND INTAKE.

The dam used for collecting the water is a small stone and timber structure about 125 feet in length and five feet high located about 900 feet above the mouth of the creek, the crest being at elevation 601. On the south bank of the creek above and below the dam is located a strip of land known as Blair Park given to the borough for park purposes. At the entrance to the park is a settlement of colored people but the drainage from this tract does not enter the creek above the dam.

Above the dam on the north side of the creek is a stretch of bottom land about 1,000 feet wide and 2,500 feet in length lying from three to four feet above the creek level above the dam.

About 650 feet above the dam a ditch enters the creek from the north. This ditch drains a swampy district near the pumping station. In this swamp near the station is a large dump where rubbish of all kinds is deposited. It is reported that garbage is sometimes disposed of at this point. At the time of the Department's inspection in April, 1907, there were three private sewers discharging kitchen drainage and one discharging sewage into this swamp from houses located on Second street, also a borough surface drain discharging kitchen drainage. These sewers have since been abandoned.

About 1,000 feet up stream from the dam a small run enters the creek. This stream receives road drainage, the discharge from springs at the base of a hill upon which is located a large cemetery and also the wash water from the filter plant. There was one case of kitchen drainage from a tenement house on the road running parallel with the creek from the corner of First and Church streets toward Donation, which it is proposed to permanently care for by extending a sewer up this road as soon as it is improved by the State Highway Department.

On a hill about 2,500 feet direct north of the dam, about 1,500 feet from the creek and 150 feet above it, is the borough pest house. The surface drainage from the ground around this building finds its way into the creek above the dam.

During floods the entire bottom land from the creek to the pumping station is under water. At such times the water above the dam is liable to receive some pollutions from the town and also during heavy local rains.

About 100 feet below the dam a twenty inch sewer laid in Washington street empties into the creek. There is a possibility of pollution here by backwater from the river.

A concrete intake conduit two and five-tenths feet by three feet and twenty feet in length provided with screens and stop planks leads the water from the dam to an open settling basin about fifty feet long, thirty feet wide and about three feet deep below the water level and ten feet deep below the surface.

At the end of the basin opposite the intake is a suction gallery twenty feet long and twelve feet wide into which the water passes through screens. This gallery contains the foot valve of the twelve inch suction line leading to the pumping station.

It is reported that the flood of March 14th, 1907 was seven feet above the crest of the dam or at elevation 608.

PUMPING STATION.

The pumping plant consists of two steam pumping engines, both are horizontal direct acting, one a Janesville, having a capacity of two million gallons per twenty-four hours, the center being at elevation eleven feet above the dam, the other being a Dunn Gordon, having a capacity of one and five-tenth million gallons per twenty-four hours and located about three feet lower than the other. Both pumps are connected with the twelve inch suction main and the ten inch force main.

FORCE MAIN AND RESERVOIR.

A ten inch force main leads from the pumping station through Washington street to Fifth street, thence up Fifth street to the reservoir, a distance of 4,800 feet. At the intersection of Washington and Fifth streets this main has a connection with the distribution sytem for direct pumping.

The reservoir is located near the top of a hill in the rear of the town and is protected from surface drainage, there being no houses or cultivated land above it. It is built partly in excavation and partly in embankment, lined with a masonry retaining wall and a concrete bottom. It has an area of 29,500 square feet, is eleven and three-tenth feet in depth and has a capacity of 3,500,000 gallons from overflow to outlet pipe. It is provided with two overflow pipes, one a six inch at elevation 831.1 and another a ten inch at elevation 830.2, not in use. The top of the retaining wall is at elevation 831.5 or 230.5 feet above the dam. The force main extends underneath the bottom of the reservoir discharging through a stand-pipe in the farther side, the top of which is at elevation 830.6 or 225 feet above the center of the electric pump.

The outlet pipe is twelve inches in diameter and leaves the bottom of the reservoir on the side nearest town. This twelve inch main is connected directly with the distribution system.

A blow-off from the twelve inch main has recently been put in in Fifth street above Cemetery street. A twelve inch gate is located below the blow-off. When cleaning the reservoir this valve is closed and the muddy water is flushed into the sewer.

FILTER PLANT.

The present filter plant was installed in 1900. It was designed by P. A. Maigen for the purpose of clarifying the water and is called a slow sand filter with preliminary upward filters or scrubbers.

The plant is located on the side hill immediately below the reservoir. It receives its supply from a ten inch main connected with the twelve inch main from the reservoir to the town and discharges through a ten inch main to circular wooden tanks twenty-three feet in diameter and fifteen feet three inches high containing 48,000 gallons each. These tanks are connected by a twelve inch main to the twelve inch main leading to the town.

The filters are contained in a frame building eighty-five feet in length and twenty-six feet in width.

There are six filters and six scrubbers arranged in pairs.

The water enters the building through a ten inch main from which a ten inch tee rises to the bottom of wooden flume or supply duct which is twenty inches wide by thirty-two inches high and supported on trestles along the side of the building.

From this duct the water is lead through a four inch pipe, the opening of which is about twelve inches above the bottom of the flume to each scrubber.

These scrubbers are cypress boxes seven feet ten inches wide, eleven feet one inch long and five feet high supported on a timber and concrete foundation and containing the following materials. At the bottom is a double layer of bricks, five inches in thickness, laid flatwise with openings between. Above this is a layer of broken stone nineteen inches in thickness in which are imbedded two layers of roofing slate laid diagonally and acting as baffles. A layer of galvanized baffle plates laid horizontally is located between the layers of slates. Above the crushed stone is a twelve inch layer of sponge which is held in place by wooden racks.

The water passes upward through the stone and sponge and is discharged through a three inch pipe located eighteen inches below the top of the tank to the adjacent filter.

The filters are cypress boxes of the same dimensions as the scrubbers and contain the following materials. Baffled brick seven inches, broken stone one-eighth inch to one and one-half inches in diameter, five inches sand twenty-four to thirty inches giving a total depth from thirty-six to forty-two inches. The water passes downward through these filters and is drawn off through a three inch pipe connected with the ten inch main leading to the storage tanks.

The scrubbers and filters are so arranged that each pair can be cut out of service for cleaning.

The three inch pipes from the filters are provided with valves and between these valves and the filter one-half inch taps are provided for draining the filters.

The scrubbers are provided with three inch drains and also with a three inch connection for supplying scrubbed water to the storage tanks.

A float in number one scrubber nearest the inlet pipe controls a ten inch butterfly valve in this pipe regulating the flow to the supply flume, the rate of flow through all the scrubbers depending upon the flow through scrubber number one.

A connection has been in use for washing the filters with raw water but has been discontinued.

The materials in the scrubbers and filters are washed by removing them in wheelbarrows to a concrete platform at the end of the filter house and washing them with raw water from the supply flume.

This plant is rated as having a capacity of 600,000 gallons per day or about fifty-one million gallons per acre per day.

A weir placed in the supply flume showed a rate of about 434,000 gallons per day of thirty-seven million gallons per acre.

When the regulating valve was set to give a flow at the rated capacity the entire plant was flooded.

CONSUMPTION.

The maximum consumption is given at 1,031,000 gallons per day, with 6,175 consumers or about 167 gallons per capita per day.

There have been no accurate measurements of the consumption made, the pump displacement being the only method in use.

There have been very few additions to the distribution system, nearly all the streets having been piped when the plant was first installed. There are numerous streets upon which there are very few consumers, about 200 wells being in use through the borough.

The installation of the new sanitary sewer system and the consequent increase in the use of modern sanitary conveniences will increase the number of consumers and the amount of water used.

It is reasonable to suppose that the company may be called on to supply water at the rate of 1,500,000 gallons per day during the next few years.

TYPHOID FEVER.

The records of the local health office show, that while there have been no large epidemics of typhoid fever, there have been some fifteen to twenty cases every year.

The following table shows the number of typhoid fever cases in Huntingdon for three years:

1905, ...18 cases.
1906, ...16 cases.
1907, ...46 cases.

The typhoid fever cases for the year 1907 are shown in the following table:

Date.	No. cases.	
January 1st, ...	1	A. P. McElwain, Second St.
January 3rd, ...	1	
January 7th, ...	2	
January 9th, ...	4	
January 14th, ...	6	
January 19th, ...	3	
January 21st, ...	1	
January 24th, ...	2	
January 30th, ...	1	
February 6th, ...	2	
February 7th, ...	3	
February 8th, ...	1	
February 12th, ...	3	
February 14th, ...	1	
February 18th, ...	2	
March 7th, ...	2	
April 21st, ...	2	
May 21st, ...	1	
	38	
To end of year, ...	8	
	46	cases.

This outbreak was scattered over the entire town which indicates pollution of water supply.

On January 1st, 1907, a case of typhoid occurred in the home of A. P. McElwain, the local health officer, residing on the south side of Second street. The rear of this property is on the edge of the swamp containing the pumping station. At the time of the Department's first inspection a sewer from this property was discharging sewage into the swamp which drains through a ditch into the creek above the dam. There had been no outbreaks previous to this case which is reported to have been contracted in Philadelphia. It is reasonable to conclude that a sewer discharging indirectly into the public water supply from a dwelling in which there was a typhoid patient might easily have transmitted the poison which was the cause of the outbreak. There were no cases reported in the vicinity of the water supply, previous to that time.

DISCUSSION.

The people supplied by the Huntingdon Water Supply Company are laboring under the delusion that they are being furnished with purified water whereas the filter plant was not designed to purify the water, merely to clarify it. The capacity is about one-third the maximum consumption.

This lack of filtering capacity and of storage for filtered or clarified water necessitates the use of a certain amount of water taken directly from the large reservoir. During the hours of maximum consumption the town is served with a mixture consisting of about one-third clarified water and two-thirds raw water which has been subjected to some sedimentation. During the night the raw water is shut off. Whenever the reservoir is out of use for cleaning or repairs, direct pumping is resorted to.

During periods of muddy water in the creek it is reported that the pumps are shut down until the water improves, but the capacity of the reservoir, 2,500,000 gallons, is not sufficient to last over two days during the summer months. This lack of storage and filtering capacity accounts for the fact that the water drawn from the spigots is nearly always cloudy after a heavy rain of any duration.

Probably the present plant will not clarify much over 400,000 gallons per twenty-four hours. Allowing for a reserve for use when the filters are being cleaned the plant should be increased in capacity about three times.

The present location of the dam in Standing Stone Creek is not good, as it is subject to pollution from several sources, including wash water from the filters and drainage from the cemetery pest house and refuse dump besides some street drainage.

The dam is a leaky crib affair, the flow through the dam being apparently as much if not more than the water pumped to the town. There has been some talk of replacing this dam with a masonry structure. It would seem advisable to move this dam further up stream to avoid some of the above mentioned pollutions.

The water could be led by gravity through a terra cotta pipe line to the present pumping station.

Another plan, and probably cheaper, would be to construct the new dam at the present site and lay out a drainage ditch to carry the surplus water below the dam.

Any work that is done should be done with the idea of eventually installing a filter plant of the most improved and thoroughly equipped pattern.

The water shed of Standing Stone Creek contains several small villages which can be reached only by long drives over poor roads and typhoid cases in these districts are frequently not reported or if so not until the infection has reached the stream. The frequency of typhoid in the town should cause the Water Company to consider every means available for improving its supply.

CONCLUSION.

These various suggestions have been offered in a tentative manner to the water company, its agents are now at work on plans and it is their avowed purpose to remodel the plant after designs which shall be approved by the State Department of Health.

KITTANNING INTESTINAL AND TYPHOID FEVER EPIDEMIC 1906-1907.

On January 28th, 1907, Dr. Fred C. Johnson, Chief Medical Inspector, made an investigation of an outbreak of typhoid fever at Kittanning. He submitted a report on February 4th, recommending that the Engineering Division give attention to the water works system and sewerage system of the borough, with a view of bringing about repairs and enlargements and permanent improvements to the system. Mr. Fred. W. Witherell, Assistant Engineer, was given written instructions to make an investigation and report, which he did, changes in the water works and sewer systems were brought about and all of these things appear fully set forth in the following report.

GENERAL CONDITIONS.

In Armstrong county, in the south central part thereof, on the east bank of the Allegheny river, and hemmed in by precipitous hills, there is a level gravel plateau (formerly a gravel bar in the bed of the river itself) from twenty and twenty-five feet above the river bed, upon which is located a community of about 6,000 people, divided by civil lines into the borough of Kittanning, the borough of Wickboro and the township of Rayburn, stated in order of importance and population. Kittanning is the county seat. It has a population of about 4,500. Immediately north of it is Wickboro with a population of 1,500. North of Wickboro is a settlement of a few hundred population in Rayburn township.

The flats are about half a mile wide and back from them a range of hills rises abruptly. A part of Kittanning territory is on the hillside. This same borough stretches along the river for a distance of about one and a half miles. While Kittanning and Wickboro are residential places, nevertheless, a considerable part of the population is supported by the industries which comprise extensive glass works, china and brick works and the manufacture of steel and iron.

The Buffalo and Allegheny Division of the Pennsylvania Railroad extends midway on the flats paralleling the river. McKean street, which is the main thoroughfare of the town, parallels the tracks and is between them and the river. In fact two-thirds of the residences of the town and practically all of the business is located between the railroad and the river. Surface water from the hillsides comes down on the flats and has given rise to the construction of sewers which receive both sewage and storm water. The principal object of the sewers in the first instance is to remove the storm water under ground to the river, preventing it ponding up east of the railroad.

The public supply of water to Kittanning and Wickboro is now supplied by a private corporation known as the Armstrong Water Company. Formerly this water company supplied Kittanning only.

On January 13th, 1906, a permit was issued by the State Department of Health to the Citizens Water Company of Kittanning for an additional water supply. The Citizens Water Company had acquired the property and franchise of the Rayburn Water Company and wished to use the Rayburn Water Company's source as the supply to Kittanning borough.

The Rayburn Water Company's property was located in Wickboro and in the township of Rayburn and consisted of a pumping station on the east bank of the Allegheny River in Wickboro, a rising main to a reservoir located on a hill back of Wickboro and also other tanks and reservoirs and land, together with springs thereon; also reservoirs located in another part of Rayburn township upon land formerly owned by John A. Colwell with all the springs and wells connected therewith; and also distributing pipes leading from said tanks, reservoirs and wells and laid in the streets of Rayburn township and Wickboro.

The Citizens Water Company's property consisted in the main of a franchise to lay and maintain pipes in the borough of Kittanning.

The supply approved by the Commissioner of Health consisted of three sources, namely: First, the Allegheny River above Kittanning opposite Wickboro. Second, three springs elevated about two hundred feet above the Allegheny River, upon land owned by the Rayburn Water Company where the river water storage basin is located. Third, (a) From a spring upon land of Valentine Newbert formerly owned by John A. Colwell. (b) From the Crotzer spring immediately adjacent to said land. (c) From the Linton spring. (d) From the Mechling spring.

All of the sources in the third district are at an elevation about 275 feet above Kittanning and Wickboro.

The original hillside spring supply was not sufficient for the use of the consumers of the Rayburn Water Company and said company went to the expense of establishing the said pumping station at the river.

With respect to the quality of the river water, it was emphasized in the decree at the time the said permit was granted, that above Kittanning the Allegheny River drains a vast area, comprising nine counties and parts of others in Pennsylvania, besides quite an extent of New York State territory. In consequence the sources of contamination are numerous, and there is a grave risk assumed when the river water is used for drinking purposes in its raw state.

Permission was withheld to supply the public with unfiltered Allegheny River water.

The Rayburn Water Company's intake in the river was a crib located in the bed of the stream about 100 feet out from the east bank. The crib was fifteen feet square, was constructed of timber, riprapped and filled in with sand and gravel, and had the inlet suction pipe to the pumps turned down through the crib to within three feet of the bottom, where the water enters the pipe.

The crib and pumping station are located up stream above all sewer outlets.

In the summer of 1905, after the Citizens Water Company's application was presented, a well was drilled on the bank about sixty-five feet from the river and about 500 feet north of the pumping station at Wickboro. In a test made for ascertaining the capacity, the well produced 1,500 gallons of water in an hour, without lowering the height of the water therein. The well is cased to below low water mark of the river and all surface water is shut off.

The river bed and the bank is composed of sand and gravel, so that water reaching the well from the river must pass through a natural filter or strainer. It was proposed to connect this well with the system of water works, and to pump all water needed in addition to the springs located on the hills.

The permit of the Commissioner of Health stipulated as follows:

"That all water taken from the Allegheny River shall be filtered, and the plans thereof shall be submitted to the Commissioner of Health for approval before construction work is begun, or said water is used. This stipulation includes the said driven well above mentioned, plans of which have not yet been submitted; the filtration through the natural filter is considered sufficient for the present. The water from this well is not likely to be permanently good, and when actively used, if it should be found at any time unsuitable in the opinion of the Commissioner of Health, for drinking purposes, thereupon permission to use the well will be revoked."

The Citizens Water Company and the Rayburn Water Company system passed into the hands of the Armstrong Water Company on January 1st, 1907, and since that time both plants have been operated by the latter company.

The Armstrong Water Company's supply is pumped from the river into a reservoir on a hill back of the town and forced directly into the water pipe system.

The main intake of the Armstrong Water Company is into the river opposite the foot of Arch street, which is in the central part of Kittanning, one block above Market street highway bridge over the Allegheny River. The water is subjected to filtration before being supplied to the consumers, unless for some cause the raw river water is pumped directly into the pipe system.

In the upper settlement in Wickboro in the vicinity of the old Rayburn Water Company's pumping station, there are sewers in the different streets which have a twenty-four inch outlet into the river below that station, but above the pumping station in Kittanning. Connected with this sewer system there is nearly a mile of lateral sewers.

In the central part of Wickboro there is a twenty-four inch sewer outlet into the river, connected to which there are about two miles of sewers.

Again in the southern section of Wickboro, adjacent to Kittanning, there are sewers which have an outlet into a Kittanning borough sewer, which empties into the river at the foot of Union avenue, also known as Cemetery street.

These sewers have their outlets all above the intake of the Armstrong Water Company. Within the borough of Kittanning and above said water works intake there are the following sewers:

A thirty inch sewer at the foot of an alley just north of Cemetery street or Union avenue.

A twenty-four inch sewer outlet at the foot of Cemetery street.

A forty-two inch brick sewer outlet at the foot of Vine street.

Below the county bridge at Market street and the water works intake there are four public sewer outlets into the river. All these sewers are built on the combined plan, take roof water and surface drainage.

The towns, especially the built-up sections, are very well sewered. Most of the properties have connection with the sewer system. Back of the railroad, towards the hill, is the unsewered section of the town and it is in this district that additional sewers will have to be laid. Here surface water ponds up because the existing sewers to the river do not have sufficient capacity to remove the rain water during intense down-pours. There is need for more efficient surface drainage as well as for sanitary sewers.

Especially in the vicinity of Clay alley is there a local nuisance which demands the building of a sewer.

Kittanning borough has about reached the constitutional limit of indebtedness, and is not in a position financially to undertake at this time the erection of sewage purification works, or the separation of sewage from storm water in the existing sewers and this is substantially true with respect to Wickboro.

DIAGNOSIS OF THE EPIDEMIC.

Dr. Johnson arrived in Kittanning on Monday, January 28th, 1907. He spent the week in the borough. Excerpts from his preliminary report show the situation as he found it.

"The January epidemic of typhoid fever was preceded by a sudden and widespread outbreak of gastro intestinal disorders which varied in severity from cases of simple diarrhoea to cases presenting the symptom complex of dysentery. People of the entire town were attacked and many compelled to take to bed owing to the prostration resulting from the severe and intractable nature of the diarrhoea. New-comers were particularly prone to the attack as evidenced by the number of cases among the personnel of the county court which convened on the first Monday in December and at the time of the Teachers' Institute during the latter part of the month. From the physicians who attended these cases, I am told that the onset was sudden, accompanied by vomiting and purging and profound prostration. Syncope was not infrequent in females and the prostration was so sudden and acute that many of the teachers were of necessity removed to their hotels in carriages.

"Another type of cases that have been fairly common were those exhibiting symptoms suggestive of a gastro intestinal form of influenza. While suffering from the prevailing diarrhoea a chill occurred usually severe in character which in many instances was followed by hyperpyrexia. Vomiting, purging, abdominal tenderness occurred in order, which in most instances was followed by fever of a remittent type, general muscular pains, malaise and a furred tongue. Many of these cases then simulating typhoid fever improved on or about the tenth day, clearing up a tentative diagnosis of that disease. Not a few of these cases were still more marked by a premonitory bronchitis.

"As regards the distribution of cases simulating influenza, inquiry among the physicians developed the fact that there were numerous cases of intestinal disorders accompanied by influenzial symptoms among the people in the country, many of whom had not been in Kittanning for periods of a month prior to their illness.

"Irrespective of the kindred diseases simulating typhoid fever, the fact remains that forty-two cases had ben reported to the Board of Health at the time of my arrival and reports of nine others have been added since. From the history of conditions in the town it is fair to presume that not all are typhoid fever, yet four deaths have occurred up to this time and there are several others dangerously ill.

"In studying the cause of the outbreak it appears that during the first week in December a change in the condition of the water was observed. The odor was bad and the taste unpleasant, as noted by tea drinkers especially. The widespread outbreak of intestinal disorders followed and on December 26th, the first cause of typhoid fever was reported. It is needless to say that professional opinion was at variance as to the number of genuine cases of typhoid fever and it is to be regretted that the lethargy of the local Board of Health may be attributed to two physicians on the board who doubted the water-borne nature of the trouble and overcame any diverse opinion that may have existed in the minds of the other members of the Board of Health at the time. The people became restless and the borough council took the matter up by appropriating $25.00 for a bacteriological analysis of the water. On January 12th, three samples were collected by Dr. Eugene Matson of Pittsburg and the President of the Board of Health was notified of a suspiciously high bacterial count in all samples two of which were filtered water. Notwithstanding the unfavorable preliminary report, no warning was given the citizens to boil water nor was any information given out by the local Board of Health concerning the nature of the preliminary report, but instead the Board of Health had a secret meeting on the 16th of January, from which newspaper men were ejected and although the people knew a preliminary report had been tendered by the bacteriologist the Board of Health remained reticent and inactive. The members of council became indignant and the local newspapers criticised the action of the board, but up to the day of my arrival not a vestige of news had been given out by the board concerning the condition of the water supplied the borough. At 11.30 a. m., Monday, January 28th, I had a conference with Dr. S. A. S. Jessup, who, with his brother Charles, are members of the local board of health. When asked what he believed to be the source of the epidemic of typhoid fever, Dr. Jessup replied that he did not believe that it was the water supply, 'that the disease was endemic throughout the adjoining country among people who had never visited Kittanning,' that he believed from the clinical history of many of the cases that 'they were catarrhal dysentery though in not a few instances they had terminated in typhoid fever.' Notwithstanding his assertion that the trouble was not due to water, Dr. Jessup stated that the well near the intake at the river received subsoil drainage and that once in the past when the physical condition of the water evidenced gross pollution he had refused to pay his water bill, but the company had not disconnected his house following a threat to do so unless payment was made.

"Dr. Jessup stated that Dr. Eugene Matson, City Bacteriologist of Pittsburg, had collected water samples on the 12th of January, but the board had heard nothing from Dr. Matson regarding the samples. He thought the milk supply was generally good, but agreed that surveillance should be maintained over the manner of its delivery. Upon leaving Dr. Jessup's office, I immediately returned to the hotel and called up Dr. Matson on the telephone. The doctor assured me that he had rendered the board a preliminary report on the fifteenth day of January and that his final report had been sent by special delivery letter two days before my arrival and should, of course, have been in the hands of the board at that time. After lunch I returned to the office of Dr. Jessup who assumed ignorance of the preliminary water report then in possession of his brother, but stated that the Secretary, Dr. Stone, had received a report from Dr. Matson on the previous day and that action would be taken at once by the local Board of Health in establishing all necessary precautionary measures. I suggested a joint meeting with council and the Board of Health which, of necessity, was deferred until the following afternoon. I then went to the office of Mr. Jacob J. Miller, Superintendent of the Armstrong Water Company and made a request for a plan of the distributing mains in the borough. Mr. Miller stated that there were none in Kittanning that all tracings were in the possession of Mr. Walker at Philadelphia. Mr. Miller stated that he had been in charge of the system for five years and that there had been no alterations in the distributing mains during the past three years, and that there were no dead ends in the system. I thereupon showed him the plans that had been submitted to the Department showing numerous dead ends and was informed by Mr. Miller that as there were none, the plans were incorrect, although he offered no excuse for the errors in the arrangement of the distributing mains as charted, claiming that the system was a complete circuit and that there were three blowoffs on Water street at the junction of Walnut, Mulberry and High streets.

"In company with Mr. Miller, I visited the pump house, well and filter plant. The well is supplied by a twenty inch pipe from a crib in the river which feeds by gravity a distance of about 250 feet to the well. It was stated on good authority that an attempt was made to use terra-cotta pipe for this purpose at the time it was originally laid, but that iron pipe was substituted later and that two or three contractors met financial reverses in attempting to carry out

a contract for its installation. The well and much of the line itself is located in gravelly soil which at one time is said to have been the former course of the river and as this formation was continually saturated, it was impossible to secure tight joints in the intake line. At the time the well was constructed great difficulty was encountered in completing the concrete base on account of the water pressure from beneath. After much labor and expense the company planked the bottom, threw in railroad iron and by means of iron spreaders completed the concrete work. Citizens contend that the well has never been water tight and through the nature of this formation, seepage is inevitable and that these conditions favoring pollution are really worse than were the water pumped direct from the river. The well is constructed of brick thirty feet deep, eighteen feet in diameter, with the sides reinforced by thirteen inches of brick and cement to a point well above the high water mark. Mr. Miller stated that the well had been cleaned out on December 17th, about one ton of sand being removed and that the well was tight at that time.

"From the well water is pumped a distance of about one-half mile to a receiving basin of 1,700,000 gallons capacity, thence it passes to the filters, five in number which were constructed by P. A. Maignen of Philadelphia.

"As related by Mr. Miller the raw water enters the filter tank at a point somewhat above the middle into the scrubber which is made up of layers of stove and nut size coke; twenty-six inches of the former and twelve of the latter. Above this the water passes through twenty-two inches of sponge, overflows into a central pipe and passes through thirty-six inches of sand, six inches of one-quarter inch gravel, six inches of one-half inch, six inches of one inch and seven inches of three inch gravel respectively and thence into the lower basin of the same size as that receiving river water. Mr. Miller states that the life of the sponge is about three years and that they are changed every two months. The gravel layers are washed with filtered water from below by thieving from the adjoining tank. The lines are so arranged that it is possible to introduce river water through a gate between the line to the filters and the collecting line delivering filtered water into the reservoir. I append a copy of Dr. Matson's letter which suggests the possibility of a mixed supply on the day his sample was taken. Mr. Miller states that their consumption is about 1,500,000 gallons per day and as the capacity of the reservoir is but little more, an idea may be obtained of the rapidity of the filtration of the water.

"At the time of my inspection of the filters with Mr. Miller the water was clear from the filters as was the case two days later when samples were collected by Dr. McKee and myself.

"On Tuesday afternoon I attended the joint meeting of the Board of Health and Council, there being a quorum for each body. After the reading of the report of Dr. Matson, I briefly reviewed the situation in Kittanning, stated the object of my visit and wished to know what was going to be done by the Board of Health for the prevention of the spread of the disease. At this point, a temperature chart of a case was presented for my inspection by one of the physicians on the Board of Health with the statement that the case had been reported as typhoid fever merely to prevent criticism. I reminded the doctor that forty-two cases of typhoid fever had been reported by his fellow physicians within the borough, that I did not care to discuss exceptional cases and believed and expressed a wish that the consummation of proper precautionary measures be no longer delayed. The meeting then progressed harmoniously and the following resolutions were passed by the Board of Health and approved by Council, viz:

"1. Closing public school taps and the closure or placarding of other taps throughout the borough.

"2. Hotels and restaurants required to furnish only boiled water and milk to patrons.

"3. That milk bottles should not be left or removed from any premises in the borough during the present epidemic, but milk should be poured into a container furnished by the householder which the milk man must not touch or handle.

"4. That lime should be delivered and privy vaults in the unsewered district should be thoroughly limed.

"5. The notice to boil water which had been inserted in the local papers on the twenty-fifth of January and which did not state how long water should be boiled was corrected, reading that only water that had been boiled for at least thirty minutes should be used for drinking or domestic purposes.

"6. A resolution was passed by Council praying that a sanitary engineer be sent to Kittanning who would make a thorough study of the system and make such recommendations as would insure a pure water supply to the borough.

"On Wednesday and Thursday I inspected the nine dairies supplying the borough, together with the farms from which adjunct supplies are obtained by the various milk men. Generally speaking, conditions were above the average. In fact but two supplies should be considered questionable, by reason of un-

cleanliness about the premises which of course would be productive of less mischief at this time of the year. Of these one was a supply furnished by George John, whose premises and stock show evidences of neglect as is the case of one of the farms from which he buys milk.

"The other case is that of Francis Fritz, who conducts rather a large dairy within the borough limits. Here eighteen head of cattle are stabled throughout the winter in a poorly lighted and ventilated barn, in a portion of which milk is stored for variable periods of time prior to its sale. The bedding of the cattle is insufficient as evidenced by the filthy condition of many of the cattle, who showed no evidence of ever having received any grooming. The drainage from the stable passes into an alley near which manure in large quantities is allowed to accumulate, and has been a time honored source of complaint to the Board of Health from property owners living in that vicinity. Personally I would not consider the present quarters used by Mr. Fritz as a proper place to store milk even at this time of the year, and would look upon it as entirely out of the question in summer months. In addition to the unfavorable conditions under which cattle are housed on these premises, I found that brewery grain was fed to the stock in large quantities.

"Two other dairymen, Messrs. Heilman and Rau, fed brewery grain to their stock, although in all instances I learned that variable quantities of bran, corn meal, and middlings were added. The grain was moist in all instances, usually obtained twice per week and in no case did I find it sour.

"On Friday afternoon, in company with Mr. Miller, I visited the holdings of the City Water Company, now owned by the Armstrong Water Company. This supply is from two springs which are piped to two tanks of about 100,000 gallons capacity, which in addition to a reservoir storing about 1,000,000 gallons of river water, supplied the borough of Wickboro. Mr. Miller stated that it was only necessary to pump river water about twice a year and that this with the spring water had been sufficient to supply Wickboro in the past. Mr. Miller stated that the pump at the river was out of commission and that no river water had been pumped for months. At the time of my inspection, the tanks were probably one-quarter full and the reservoir entirely empty, but from the physical appearance of the ice at the sides I should say that it had been rather recently exhausted. Although Mr. Miller states that the Kittanning mains are connected to those of the former City Water Company in Wickboro, he claims the gate is closed and no water from the Kittanning mains has been supplied in Wickboro. It seems hardly possible that the supply from the springs will be adequate for consumers in Wickboro and I believe if Kittanning water has not been introduced into this system that this will necessarily follow in a short time. Cases of typhoid fever have appeared in Wickboro for over a year which I believe is explained by the admission of Mr. Miller that raw river water was mixed with the spring water supplied consumers.

"Affairs at Kittanning are being watched by many of the towns along the Allegheny valley and I believe much good would accrue from an early and rigid inspection of the holdings of the Armstrong Water Company by the Engineering Division. The character of the intake line from the river to the well at the pump I believe worthy of investigation and its abandonment considered by the engineer. The crib itself is located in an unfavorable position in the river from reports as the sewage from Wickboro passes directly over it.

"On Thursday noon a broken sewer line was reported on Water street directly over the intake line from the crib to the well. Upon investigation I found that such was the case and that sewage was escaping at the site of a former break in the sewer which occurred at the time the intake line was laid. As the water was disappearing as fast as it was discharged it appears altogether probable that the sewer had been leaking for some time. As the intake line was some twelve feet beneath the broken sewer, I was unable to wait until the excavating was completed and the exact course of the water and the condition of the joints of the intake line determined.

"Numerous samples of water, as well as milk from the various dairies were collected by Dr. McKee and myself and sent to the laboratories for examination. A review of the data collected by us on the individual cases shows that all had been users of Kittanning water and that no other medium of dissemination had been accessible to the cases or could be held responsible for this sudden and widespread outbreak of the disease. Other than a few instances where the victims were boarders, the people are self sustaining and there appears no probability that aid from other sources will be required. The indigent sick are as a rule removed to the Kittanning General Hospital and an 'Order of Relief' executed for their maintenance and treatment."

ENGINEERING INSPECTION OF THE WATER WORKS SYSTEM OF KITTANNING AND WICKBORO BOROUGHS.

EXTENT OF DISEASE.

The first engineering inspection of the water works was made on February 13th to 16th, inclusive. At that time there were seventy cases of typhoid fever in the district according to the report of Dr. McKee, the County Medical Inspector, and when the epidemic had passed there were reported 139 cases distributed as follows: In Kittanning, December 8, January 9, February 8, March 14, and April 18, and in Wickboro for same time twelve cases.

A house to house canvass for the number of peolpe afflicted with gastro-enteritis, or kindred epidemic, during the December outbreak was not undertaken and was unnecessary. About everybody was afflicted. Probably ninety per cent., or 5,400 cases out of a total population of 6,000, is a fair estimate. There were two deaths from typhoid fever in November, two in December, 1906, and three in January, three in February, three in March, and one in May, 1907, in Kittanning borough, and one in Wickboro for the time, making fifteen deaths in the district. The citizens may drink their own pollutions and to this fact may be attributed the epidemic.

No wonder typhoid fever has been more or less prevalent in Kittanning in years past. During the winter of 1902, and 1903, there was an outbreak of typhoid fever, which resulted in the enforced installation of a filter plant to purify the river water.

INTAKE CRIB AND PIPE.

The water supplied by the Armstrong Water Company is taken from a crib in the river. This crib is approximately 400 feet from the river bank. At this point the Allegheny River is about 900 feet wide. The crib is said to be eighty feet long, sixteen feet wide and five feet deep, and is constructed somewhat like a corn crib out of heavy plank and timber. The top of this crib is two to three feet below the bed of the Allegheny River. At times the river current is sufficient to wash away some of the gravel and sand on top of the crib. The top is two inch plank and is intended to be tight. A twenty inch cast iron pipe extends from this crib to a well located in the center of the block on the flats in the town bounded by Vine, Arch, Jefferson and Water streets. The pipe is 600 feet long or thereabouts and is laid at a grade so that the end at the well is two and five-tenths feet below the end in the crib. Pipes were calked, so it is reported, when the line was laid.

INTAKE WELL.

The well is twenty feet in diameter and thirty-six feet deep. A twenty inch pipe enters the well about two and five-tenths feet from the bottom and is provided with a gate valve. The side walls are made of brick and they are several feet thick. The bottom is concrete of several feet of thickness. Railroad iron was imbedded in the concrete to make it stronger. When the present owners of the water company purchased the plant, the well leaked considerably. So an inside brick wall was constructed thirteen inches in thickness from the bottom of the well up to a point below the top. The space between the new and old wall was grouted with Portland cement. At the same time some concrete was put into the bottom of the well. From statements of citizens antagonistic to the water company, it would appear that the present well is practically water tight. No leakage was observed to occur when it was cleaned out during December of 1906. A good deal of sand and gravel flows in with the water from the crib to the well and necessitates the cleaning out of the well every four to eight weeks. On December 17th, about one ton of sand was removed. At the time of the Department's first engineering inspection the water in the well was about three feet above the bottom of the main suction pipe of the Barr pumping engine. No leaks were observed in the side walls above this point.

PUMPING PLANT.

The pumping station is adjacent to the pump well, an alley intervening. In the pump house are located two pumping engines set up in a pit. There are two steam boilers, each of about 125 H. P. Gas is burned for fuel as the borough is in the natural gas field. The old engine has a rated capacity of

two and five-tenths million gallons per twenty-four hours against 100 pounds pressure. It is an outside packed plunger, direct connected straight line duplex, combined Worthington pump and is about twelve years old. It has a tweve inch suction pipe into the receiving well. The pipe terminates about eight inches above the bottom of the well, so it is reported. This pump also has a ten inch suction pipe to the river. It is not used, being much too small. However, the line has not been completely abandoned.

The other pump in the station is a duplex crank and fly-wheel Barr engine with a rated capacity of three and five-tenths million gallons daily against 100 pounds pressure. It was installed about 1899. The engine has not been a perfect success. It is this pump which is used principally, and ordinarily it is run from twelve to fifteen hours per day. The water end of this pump is located in a pit about twenty feet deep.

The water consumption is between 1,000,000 and 1,400,000 gallons per day. When in operation, the pumps are run steadily and the water is forced directly into the reservoir on the hillside east of the borough in Rayburn township. During fires the rate of the pump is not materially changed, as there is no connection between the force main and the gridiron system of mains in the streets.

The rising main from the pumping station is 2,700 feet long to the upper reservoir and is sixteen inches in diameter. The water must be delivered through this force main into either the upper or lower storage basin. With a rate of pumping of approximately two and a half million gallons a day, which is the normal rate, the total working head on the pump is abount 100 pounds. The static head is eighty pounds.

The Barr pump has an eighteen inch suction pipe into the receiving well. It terminates about two feet from the bottom.

It was the original intention of the constructors of the system to connect the receiving well with the river crib by a terra cotta pipe line but the idea had to be given up owing to the depth of earth where the line crossed Water street which is the highway through the town at the top of the river embankment. The depth at this point is about twenty-four feet and it was found that the terra cotta pipe would not stand the strain. So the line was laid with cast iron pipe and it is reported that all joints but one were caulked with hot lead.

RESERVOIRS.

There are two storage reservoirs having a difference in elevation of about twenty-six feet. The Maignen filter plant was constructed between these reservoirs about three years ago. Since then the water has been pumped directly from the station to the upper reservoir, an elevation of approximately 185 feet. The structure is 150 feet long by 125 feet wide and has a depth of about twenty feet. It consists of earth embankments with a slope of one and five-tenths to one. The width on top is twenty feet. On the inner slopes the reservoir has been puddled wih clay topped with a brick lining, two bricks in thickness. The bottom is cement laid on clay puddle. The capacity of the basin is about 1,700,000 gallons when full. The reservoir is occasionally cleaned of mud and sand. This was done in 1905. Since that time the water has not been drained out. The inlet is at the north end through a sixteen inch pipe elevated three feet above the high water level. The outlet is about midway on the west side at an elevation of four feet from the bottom. There is a drain pipe at the southwest corner of the reservoir which discharges into a town sewer. The upper end of the drain is stopped with an iron plug. A structure with a target floats on the surface. The engineer at the pumping station by means of a spy-glass determines by looking at the target the height of the water in the basin. A twelve inch pipe leads to the filter plant.

FILTER PLANT.

The filters are situated inside of a covered brick building. The floor of this building is eighteen inches or so above the high water level in the filtered water basin. The house is 100 feet long and thirty feet wide. Within it are five filters with their centers located approximately on the longitudinal axis of the building. Each filter is fifteen feet in diameter and fourteen feet high. The maximum head between the top of the filter and the high water level in the raw water basin (upper reservoir) is twelve feet. It is possible to use only about ten vertical feet of water in the raw water basin, which is equivalent to about 1,100,000 gallons.

The rate of filtration for the whole plant is about 1,500,000 gallons per day. At times the rate of filtration for any one filter is considerably increased over this amount.

Each one of the five tanks contains in the lower eight feet a sand filter and in the upper six feet, the scrubber. Water comes from the raw water main inside of the filter house and is introduced into the bottom of the scrubber, so

called, or preliminary filter, which is in the upper six feet of each tank. The water then flows upward through the coke layers and the sponge bed, floods the latter and passes down through a ten inch pipe in the center of the tank to the sand bed occupying the lower eight feet of the tank, and thence through the sand bed into the collecting system and eventually into the filtered water basin. No coagulant is used in this process. Each sand filter is operated at the rate of a mechanical filter, perhaps averaging 70,000,000 gallons per acre per day.

The construction of the scrubber is as follows: On the bottom of the scrubber are two lines of six inch terra cotta pipe laid at right angles, one end being connected to the inlet pipe directly and the others indirectly. Holes are drilled in the six inch pipes about four inches apart. Around the tile and covering it to a depth of about six inches is a twelve inch layer of three inch coke. On top of this layer is a twenty-six inch layer of one and one-half inch coke. On top of the fine coke is a twenty-two inch layer of sponge. This sponge is held in place by plank four inches wide placed one-half inch apart and held down by blacks and tie rods. Water from the raw water basins after a sedimentation period of perhaps twelve hours is drawn into and passes up through the scrubber and the coarser suspended particles are removed. A gelatinous coating forms on the sponge and is the most valuable filtering material in the scrubber. It is necessary to wash the latter about as frequently as the sand filters, i. e., at least about every few days, but sometimes it is necessary to clean the scrubber from one to four times a day. The device seems to be quite efficient in removing ordinary suspended matter. It is only during extreme turbidities that the water is discolored after passing through this scrubber.

The water rises over the plank on the scrubber sufficiently to pass down through a ten inch vertical pipe in the center of the scrubber and thus it flows onto the top of the sand filter below.

The construction of the sand filter is as follows: On the bottom of the sand filter is a six inch terra cotta pipe collecting system similar to the one described for the scrubber except that an outlet of the six inch pipe connects to the filtered water basin and an outlet to one of the other pipes connects to the sewer. Around and on top of this terra cotta pipe is a layer of three inch gravel, eight inches in depth, supporting a two inch layer of gravel six inches in depth on which is placed a one inch gravel six inches in depth. Then come two layers of gravel of fine quality, one six inches in depth of one-half inch gravel and the other a two inch layer of one-eighth inch gravel. On top of the finest gravel is a three foot layer of coarse sand made of crushed quartz. On top of this coarse sand is found a layer of fine sand one and one-half inches in thickness.

At the time of the Department's first engineering inspection, the sand surface was five and one-half feet above the bottom of the filter tank and about two and one-half feet below the plank bottom of the scrubber. This space of two and one-half feet in height and fifteen feet in diameter is ordinarily filled with water when the filter is in operation.

A ten inch pipe comes down through the filter out through the bottom of the tank to the sewer. When the outlet valve on this ten inch pipe is closed, the pipe is used to carry water from the scrubber to the filter as before stated. But this ten inch pipe is also used when the outlet valve is open to carry away waste water during washing. Ten slots are cut in this pipe to serve for this purpose.

There is one inlet valve on the pipe which supplies the scrubber and there is one outlet valve on the pipe from the filter. There are also three other valves, one on the wash water waste pipe from the scrubber, one on the wash water waste pipe from the filter, and the third is on the filtered water or waste pipe from the filter. All three of these last named pipes discharge into a sewer which is made of brick eighteen inches wide, two feet deep and has an open top. This sewer eventually connects with an eight inch pipe joining the Kittanning borough sewerage system near the Armstrong county court house. Systematic arrangement for valves and piping for easy operation of the filter pipe is lacking.

Ordinarily a scrubber and its corresponding filter are operated as a unit and both are allowed to work together until it is necessary to wash. The operator determines this by noticing that the water just after going through the scrubber is slowly rising in the compartment in the tank above the top of the scrubber and that the water is flowing down the central pipe from the top of the scrubber to the filter. At such a time the positive head of water on the filter is in the neighborhood of seven and one-half feet and the negative head on the top of the filter sand to the outlet of the filtered water pipe in the filtered water basin is approximately eight and one-half feet. So the available head is approximately sixteen feet. Possibly the initial frictional resistance is in the neighborhood of two feet, so that the actual available head for filtration is only in the neighborhood of fourteen feet.

FILTER CLEANING.

The filters are allowed to run from two to four days depending upon the conditions of the river water. On February 13th the river water was comparatively clear and the filters were being washed only once in four to five days; when the river water is very turbid the filters are washed every twenty-four hours and sometimes it is necessary to wash them from three to five times in succession to remove the suspended matter from the scrubber and sand bed. There are only two large pipes each twelve inches in diameter in the filter building. One of these is used as a raw water pipe and the other is used as a filtered water outlet main. There is no wash water pressure line in the building. In the beginning the operator attempted to wash with filtered water, taking the supply from the other four filters when the fifth unit was being cleansed. But this was found impracticable and was abandoned on account of lack of water and adequate pressure. Since then the filters have been washed with raw water, forced from the raw water main into the filtered water main through a by-pass. Under the present conditions this is the only way that an adequate amount of wash water can be obtained and a sufficient pressure also. The latter during washing, is in the neighborhood of seven pounds.

When it is necessary to use the scrubber, the inlet raw water valve to the scrubber is closed after the scrubber has been filled up with water and another valve on the other end of the six inch tile underdrain into the scrubber is opened. Water from the scrubber then drains into the sewer until the scrubber is practically emptied. It is then necessary to fill the scrubber up a second time from the raw water valve and allow this water to flush out what suspended particles it can into the the sewer a second time by opening the sewer valve. Ordinarily this operation is repeated four or five times. The period of washing is about ten minutes and ordinarily 5,000 gallons of water is thus consumed. Practically all of the suspended matter is in the sponges. Very little is to be found in the coke. About once every two or three months it is necessary to take out the sponges, thoroughly wash them, wash the coke and turn it over with a pitch fork and then replace the sponges. The scrubber is washed downward with the gravity head only. The sand filter, however, is washed upward.

When it becomes necessary to wash the sand filter all of the filters are shut down, that is all inlet and outlet valves are closed. The valve on the filtered water pipe in the filtered water basin is closed, and a by-pass between the raw water and filtered water mains is opened, thus admitting raw water into the filtered water mains. The filtered water valve on the filter to be washed is opened and so is the sewer valve on the waste wash water line. Wash water then passes through the terra cotta pipe system up through the sand bed and through about one foot of muddy water on the sand surface and then out through slots in the ten inch vertical pipes, (these slots being two inches wide and about eighteen inches long), and down through the ten inch pipe and out into the rectangular sewer.

This filter washing is at a rate of about 1,000 gallons per minute for from every eight to fifteen minutes under a head of approximately seven pounds. When the wash water comes out comparatively clear, the washing ceases and the filter is started in operation. Usually the scrubber is washed just prior to the sand filter washing, and both are started in operation together. The first filtered water is said to be wasted from five to fifteen minutes and up to such a time as the filtered water becomes clear.

FAULTY DESIGN.

After the washing operation, the filtered water main inside of the filter house is full of raw water which when the filtered water valves are opened to the filtered water basin, runs directly into the said filtered water basin in advance of the filtered water from the sand filters. The length of this twelve inch filtered water main is nearly 100 feet, so it is seen that nearly 500 gallons of unfiltered water is let into the filtered water basin after a filter wash.

It is to be noted that when the filter unit is in operation, the inlet valve of the scrubber is partly closed, but the outlet valve from the sand filter into the filtered water basin is kept wide open. At such a time or perhaps an hour longer, filtered water probably would flow from a freshly washed filter unit into the filtered water basin at a rate of perhaps four or five times the normal rate. As no coagulant is used, efficiency of removal of bacteria might be very low for several hours after the filter is washed and put in operation.

The Department had one of the filters drained after it had been run for about five days. It was found that the surface of the sand did not have a good gelatinous schmutzdecke as the suspended matter in the top sand presented more of a granular than a gelatinous appearance. It appeared that the schmutzdecke made by this process was inferior to that formed on a mechani-

cal filter by a coagulant. There was about one inch only of fine sand on top of the coarse sand, and this fine sand did not look dirty, although the filter had been used for about five days and had been operated at a rate of nearly 70,000,000 gallons per acre per twenty-four hours. Several inches of fine sand had been washed off the top of the bed during its three years' use. It is quite probable that the filters are not as efficient as when first constructed.

It should be noted that the tile drain in the bottom of the sand filter is not strong enough to sustain the wash water pressure of even seven pounds for some of these tiles have cracked and broken, letting gravel and sand into the clear water basin.

FILTERED WATER STORAGE.

The filtered water flows into the filtered water basin (lower reservoir), at an elevation of about one foot below the high water level of the reservoir. The basin is about 125 feet square and twenty-four feet deep. Its construction is similar to that of the upper reservoir already described. The supply main to the town is a fourteen inch pipe. Its end is about four feet from the bottom of the reservoir. There is a blow-out on the bottom which is made tight with an iron plug. If necessary for any cause, raw water can be pumped directly into this filtered water basin. It holds about 1,000,000 gallons and supplies the town during the night and furnishes all the water used in fires.

In the summer time the filtered water in the basin is full of algae. This is manifest in the town. The water drawn from the taps shows considerable filamentous growth and has a disagreeable odor. This vegetable growth in the water will rapidly clog with a thick, green slimy scum, small house filters such as are attached to faucets, etc. The citizens state that when the filter plant was started the water seemed to be quite clear and satisfactory but that since the summer of 1905 the filtered water has not been clear at all times and that generally it has a slight, mouldy odor and taste. When the river water is very turbid the filtered effluent is also turbid.

PIPE SYSTEM.

The system of street pipes receiving filtered water extends through Kittanning and Wickboro. The Armstrong Water Company has about 4,500 consumers in Kittanning and about 600 in Wickboro. There are a small number of wells in use in the borough. The court house is the only building of any size in Kittanning that is not supplied with filtered water. According to reports this building is connected with the Reyburn Water Company source. The street mains vary in size from four to twelve inches. The principal streets are well piped and the diameters are usually greater than four inches. The hydrants are located at all important street corners and the water pressure is between seventy and eighty pounds. There are three blow-offs on the pipe system all of them being along the river front on Water street. There are a few dead ends in the system. There is no direct connection between the pumping station and the street mains but the raw water may be by-passed from the raw water basin to the filtered water main leading to the town, so that it is easy to understand that a great many typhoid fever cases were found within two blocks of the point where the filtered water main coming down the hill makes the main connection with the street pipe system at the corner of Grant avenue and the alley between Arch and Vine streets.

DISTRIBUTION OF TYPHOID CASES.

The 5,400 cases of violent bowel disorder were, of course, distributed generally throughout the water district. Practically all of the cases of typhoid fever were among the water company's customers and principally in the dwellings along the larger mains or at points where the filtered water first reaches the consumers.

A case of typhoid fever was in the Mechling house on which property one of the springs of the Reyburn Water Company's supply is located. The patient attended by a local physician. The drainage from the property goes into the run below the collecting reservoir hereinbefore described as a part of the Reyburn Water Company's system. A small pipe delivers this water, with that of neighboring springs, along the Clearfield pike to Oak street in Kittanning and thence to Johnson avenue in Wickboro. It is reported that the only building in Kittanning connected with this pipe is the court house, therefore suspicion is not attached to this case as the origin of the epidemic.

Furthermore, the Reyburn Water Company pumping station in Wickboro was abandoned and the pump removed and the storage reservoir on the hillside was out of service. This was done some time about the middle of December. The pumps which were removed had a capacity of about 200,000 gallons per day

so it was reported. Since January first there has been a connection between the Armstrong Water Company and the Reyburn Water Company. It is a four inch pipe fitted with a gate valve on Orr avenue in Wickboro.

Examinations of samples of water made by the Department showed the spring source of the Reyburn system to be satisfactory. The analyses of the water from the Armstrong system showed unsatisfactory results as elsewhere appears.

RIVER WATER.

On December 6th, 1906, there was a rainfall of one and three-tenths inches. The ground was frozen and the run-off was therefore, effectually a scour. Sewage pollution everywhere on the watershed in New York and Pennsylvania was thus washed away, and passed into the river with sediment and suspended matters of all kinds. There was a heavy rain on December 13th and one again on the 31st. Between these dates, when the river was in flood flow, the water was turbid. In fact this turbidity continued to about February 1st, 1907, since which date up to the time of the Department's first inspection the water was reasonably clear, so that the sewage pollution of the public supply of Kittanning was more than that caused by the discharge of the sewers in Kittanning and Wickboro. Pollutions from the towns and cities remotely located in the Allegheny basin above Kittanning might have been brought down and introduced into the water pipes of the Armstrong Water Company owing to the freshet stage of the river and the swiftness of the currents. Analyses of the river water showed sewage pollution. Since fine particles of clay and coloring matter passed through the water filter into the distributing system and reached the homes, pathogenic organisms could have done the same. At the time of the freshet on December 10th, the fine sand and gravel covering over the river intake crib was washed away to some extent.

WATER STREET SEWER.

A twelve inch borough sewer carrying considerable flow and laid about ten feet below the surface in Water street, was broken where the twenty inch intake pipe passes under the sewer. This break was repaired by the water company. The sewer for a distance of from twelve to fifteen feet was enclosed in a wooden box. On about January 25th this sewer broke again and a large hole dangerous to highway travel was made by the sewage. The street was closed up to highway traffic at this point. It was claimed that the sewage was flowing into the water works intake pipe but no evidence of this was gathered at the time. Sewage could be seen seeping down the river embankment.

During the week of February 13th the Department's representative put twenty-five pounds of common salt into the sewer at the break. He then tested samples of the Allegheny River water over the intake and the water which was pumped out of the suction well at the station. Samples were collected for several hours and frequent determinations for chlorine were made. Samples of water were also taken from the suction well before this experiment was commenced. The pump was run at a comparatively high rate and the water was being drawn rapidly into the suction well. There was no increase in chlorine due to the salt thrown into the broken sewer opening. On the contrary the chlorine in the water in the well, owing to a slight rise in the Allegheny River due to melting snow, was diminished. The conclusion formed was that there was no opening at that time in the twenty inch cast iron suction pipe near the broken sewer of sufficient size to permit the entrance of any appreciable quantity of sewage.

REMEDIES ENFORCED BY THE STATE DEPARTMENT.

The remedies to assure pure water supply to the consumers which were immediately enforced by the Department were:

1. The treatment of the water at the upper reservoir with the germicide, copper sulphate.
2. The improvement of the filter plant so that filtered water shall be always used in washing the filters.
3. The introduction of coagulants into the water ahead of the filters.
4. The regulation of the rate of filtration.
5. The cleaning out of the reservoirs, water mains, reservoirs and water mains in the streets and the flushing of dead ends.
6. The repairing of the sewer in Water street.

IMPROVEMENTS.

On Saturday, February 23rd, copper sulphate was introduced into the raw water at the rate of one part in 1,000,000 by weight. The treatment was kept up until the filters produced good results.

A small building was erected to house two wooden coagulant tanks each about five feet in diameter and five feet high. Automatic apparatus was installed in this building to feed the coagulant solution into the raw water as it comes into the settling basin during times when the pumps are being operated. The shutting off and turning on the coagulant feed was accomplished automatically. Sulphate of alumina was dissolved in water and allowed to flow into the raw water at the rate of seven-tenths to one and five-tenths grains per gallon of water treated. After this treatment the water was generally satisfactory. Before this time the filtered water showed coli, but since the first of March the water bacteria in the filtrate averaged less than 100 per cubic centimeter and coli was not found in one cubic centimeter, with few exceptions.

A change in the method of operating filters was inaugurated. No raw river water was allowed to go into the filtered water basin and only filtered water drawn from the other filters was used to wash with. This way, however, gave a rate of about 800 gallons per minute, too small for efficiency, but the company installed a gas engine and centrifugal pumps and connected them up with the filters and washed the filters with this additional force. This was done as soon as possible. The capacity of the pump was 1,500 gallons per minute against a twenty foot lift.

The top sand for one of the filters was removed and new, clean, fine, crushed quartz put in its place. The distance between the top of the sand bed in the alternate filter and the bottom overflowing aperture in the wash water outlet pipe was made fifteen inches. The same distance in the other filters is twelve inches only. So three inches of sand was taken out of all the filters in order to keep the top sand, which is the best, from being washed out of the filters during the cleaning operation.

The river freshets fill the twenty inch intake pipe with sand and gravel, enough to require the reducing of the speed of the pumps one-half. During March it was necessary at times to shut down the pumps and wash back the suction pipe from the reservoir on the hill, and to do this every hour or hour and a half. Before the freshet on December 10th, undoubtedly there was considerable sand and gravel on top of the river crib, but afterwards this was washed away more or less, and raw river water with all the silt it contained brought in, together with some of the sand and gravel which filled up the crib. On account of this shortage of water the reservoir and water pipes in the town could not be properly flushed out. Owing to the complete filling up of the crib with sand and gravel during the first of April, water was taken from a point about ten feet outside of the crib. A strainer was put on the temporary end of the suction pipe. Divers had to be employed to make temporary repairs to the river intake. In was reported during April that after the river freshet subsided and during the back-washing of the twenty inch suction pipe a small leak developed in the pipe near the broken sewer on Water street, but this could never be verified by the Department. But the Department advised the laying of several lengths of cast-iron sewer pipe over the twenty inch intake.

On April 19th the filter plant had been put in good shape and was doing good work. The bottom of the clear water basin could be seen through about fifteen feet of filtered water. One grain of alum per gallon was being used and applied to the raw water as it flows into the subsidence basin.

WATER ANALYSES.

The following table shows the bacteriological analysis of samples of water collected in the Allegheny River over or opposite the intake. The bottles were packed in ice and expressed to the State Department of Health Laboratories at the University of Pennsylvania, Philadelphia, where the samples were examined:

TABLE NO. 1.

RAW RIVER WATER.

Date of Collection. 1907.	Ordinary bacteria per c. c.	Colon per c. c.
January 17th,	480	1
February 17th,	600	.....
February 27th,	70	.....
March 1st,	140	.....
April 5th,	14,000	100
April 15th,	350	2
April 17th,	210	.....
April 23rd,	280	.....
April 28th,	1,200	14
April 29th,	1,800	.....
June 25th,	500	10
June 26th,	2,400	10
June 27th,	490	26
June 28th,	350	5
July 1st,	350	7
July 2nd,	6,000	40
July 4th,	3,000	.....
July 4th,	910	.....
July 9th,	350	.....
July 10th,	4,800	.....
July 11th,	400	5
July 11th,	10,000	.....
July 12th,	2,400	30
July 15th,	420	.....
July 17th,	4,200	.....
July 18th,	3,600	.....
July 19th,	22,000	6
July 19th,	32,000	.....
July 22nd,	4,000	20
July 23rd,	8,000	.....
July 24th,	130	.....
July 25th,	24,000	.....
July 29th,	685	1
July 30th,	840	2
July 31st,	60	.....

It will be noted from the above table that sewage organisms are present in the water although nineteen samples do not reveal them.

The next table shows the results of bacteriological examination of samples of water collected in the pump well. It and Table No. 3, of water taken from the tap in the main as it leaves the pumps, shows sewage pollution in the waters. On the whole the well and pump waters show more sewage organisms than the water in the river.

TABLE NO. 2.

RAW WATER IN PUMP WELL.

Date of Collection. 1907.	Ordinary bacteria per c. c.	Colon per c. c.
January 17th,	2,800	3
February 1st,	1,300	12
February 27th,	910	4
April 7th,	10,000	30
April 15th,	140	2
April 17th,	420	.....
April 23rd,	420	.....
April 28th,	1,800	30
June 25th,	500	10
June 26th,	2,300	30
June 27th,	630	.....
June 28th,	360	.....
July 1st,	280	3
July 2nd,	4,200	.....
July 4th,	4,200	10
July 4th,	280	3
July 4th,	430	2
July 9th,	1,800	.....
July 10th,	350	.....
July 11th,	1,200	2
July 11th,	160	.....
July 12th,	420	10
July 15th,	500	1
July 17th,	2,000	1
July 18th,	1,800	.....
July 19th,	16,000	.....
July 19th,	8,000	14
July 22nd,	300	.....
July 23rd,	300	6
July 24th,	90	.....
July 25th,	280	2
July 29th,	116	.....
July 30th,	630	.....
July 31st,	350	.....

TABLE NO. 3.

RAW WATER FROM PUMP.

Date of Collection. 1907.	Ordinary bacteria per c. c.	Colon per c. c.
January 17th,	7,000	20
February 17th,	16,000	1
February 17th,	22,000	4
March 4th,	2,400	30
March 7th,	1,200	6
March 11th,	630	100
March 15th,	5,000	500
March 25th,	5,000	100
March 31st,	10,800	150
April 15th,	100	15
April 17th,	350	.....
April 23rd,	180	.....
April 28th,	4,800	5

Table No. 4 shows the raw water in the upper receiving basin on the hill. Copper sulphate was introduced on February 23rd and during March and April the bacteriological examinations of the water in the river showed the effect of this germicide but the tests prior to and after this period showed the presence of sewage organisms to a greater or less extent:

TABLE NO. 4.

RAW WATER BASIN.

Date of Collection. 1907.	Ordinary bacteria per c. c.	Colon per c. c.
January 17th,	49,000	3
February 17th,	104,000	4
February 17th,	27,000	20
February 22nd,	160	.....
February 27th,	28	.....
March 1st,	50	.....
March 1st,	30	.....
April 5th,	38,000	.....
April 15th,	50	.....
April 17th,	18	.....
April 23rd,	70	.....
April 28th,	540	2
April 29th,	490	.....
June 25th,	800	2
June 26th,	490	10
June 27th,	500	.....
June 28th,	120	5
July 1st,	180	.....
July 2nd,	18,000	6

TABLE NO. 4—Continued.

Date of Collection. 1907.	Ordinary bacteria per c. c.	Colon per c. c.
July 4th,	3,600	40
July 4th,	350	4
July 4th,	160	.....
July 9th,	2,000	.....
July 10th,	700	.....
July 11th,	560	.....
July 11th,	560	70
July 12th,	630	30
July 15th,	8,000	50
July 18th,	2,000	.....
July 19th,	3,000	26
July 22nd,	5,000	8
July 23rd,	1,600	.....
July 24th,	190	.....
July 25th,	4,800	10
July 29th,	1,200	2
July 30th,	350	.....
July 31st,	540	.....

Table No. 5 shows the results of special bacteriological tests of water at the filter plant. It is to be noted that after February 23rd the water bacteria in the filtered water averaged less than 50 per cubic certimeter and coli were not found in one cubic centimeter, and this followed during April, May and June.

TABLE NO. 5.

SPECIAL TESTS OF WATER AT FILTER PLANT.

Date of Collection. 1907.	Place.	Bacteria per c. c.	
		Ordinary.	Colon.
February 1st,	Filter No. 2,	200	4
February 17th,	Filter No. 5,	3,600	2
February 17th,	Scrubber No. 3,	3,600	.....
February 17th,	Filter No. 1,	260	2
February 17th,	Scrubber No. 2,	4,000	20
February 22nd,	Scrubber No. 2,	210	.....
February 27th,	Scrubber No. 5,	29	.....
February 27th,	Scrubber No. 3,	15	.....
February 27th,	Filter No. 5,	26	.....
February 27th,	Filter No. 1,	21	.....
March 1st,	Filter No. 1,	18	.....
March 1st,	Filter No. 3,	40	.....
March 1st,	Filter No. 4,	40	.....
March 1st,	Scrubber No. 1,	30	.....
March 1st,	Filter No. 5,	28	.....
March 1st,	Filter No. 2,	46	.....
March 1st,	Filter No. 1,	34	.....

In observing Table No. 6, which gives the tests of waters gathered from the filtered water basin, it will be seen that during January and February, up to the 18th of February, sewage organisms were found in the filtered water basin, but that during March and April and up to June 29th there were no sewage organisms in the clear water basin and the ordinary bacteria averaged eighty, with two exceptions. During July at times there were as high as thirteen colon per cubic centimeter in the filtered water, although fourteen samples out of twenty-one samples showed the presence of coli. Of course, the integrity of the management of the water filter plant must be relied upon for the observance of the instructions given by the State Department of Health for the operation of the plant. If the settled water from the rising main were by-passed into this filtered water basin and mixed with the filtered water, the result would be naturally an inferior water.

TABLE NO. 6.

FILTERED WATER BASIN.

Date of Collection. 1907.	Ordinary bacteria per c. c.	Colon per c. c.
January 17th,	180	.....
February 1st,	160	4
February 17th,	360	2
February 17th,	420	10
February 22nd,	60	.....
February 27th,	30	.....
March 1st,	46	.....
April 3rd,	300	.....
April 15th,	133	.....
April 17th,	7	.....
April 23rd,	80	.....
April 28th,	13,500	.....
April 29th,	2,100	.....
June 25th,	200	.....
June 26th,	40	.....
June 27th,	100	.....
June 28th,	40	1
July 1st,	300	.....
July 2nd,	100	2
July 4th,	95	5
July 4th,	210	.....
July 4th,	210	2
July 9th,	1,400	.....
July 10th,	350	.....
July 11th,	570	10
July 11th,	400	.....
July 12th,	350	.....
July 15th,	70	13
July 17th,	300	.....
July 18th,	100	1
July 19th,	630	.....
July 19th,	400	1
July 22nd,	40	.....
July 23rd,	2,000	.....
July 25th,	27	.....
July 29th,	120	.....
July 30th,	180	.....
July 31st,	80	.....

It will be observed that generally the water was low in ordinary bacteria and that coli were absent. Out of the thirty-eight samples given in the above table, only eleven showed colon. How this pollution got into the system of water pipes cannot be ascertained.

TABLE NO. 7.

WATER FROM TAPS IN TOWN.

Date of Collection. 1907.	Place.	Bacteria per c. c.	
		Ordinary.	Colon.
April 23rd,	Stine Hotel,	6	
April 29th,	Stine Hotel,	60	
June 25th,	Stine Hotel,	32	
June 26th,	Stine Hotel,	40	
June 27th,	Stine Hotel,	16	
June 28th,	Stine Hotel,	21	
July 2nd,	Stine Hotel,	62	
July 2nd,	Stine Hotel,	62	
July 4th,	Stine Hotel,	490	
July 4th,	Stine Hotel,	200	
July 5th,		40	
July 11th,		40	
July 15th,		40	
July 17th,		8,000	
July 19th,		5,400	2
January 17th,	Sturgeon Drug Store,	15	
January 30th,	Sturgeon Drug Store,	18	
February 17th,	Sturgeon Drug Store,	200	1
March 1st,	Sturgeon Drug Store,	32	
March 7th,	Sturgeon Drug Store,	210	
January 17th,	General Hospital,	70	
February 27th,	General Hospital,	35	
March 4th,	General Hospital,	9	
March 11th,	General Hospital,	4	
March 31st,	Eagle Hotel,	1,800	
June 27th,	Eagle Hotel,	41	
June 28th,	Eagle Hotel,	20	3
July 5th,	Eagle Hotel,	70	
July 9th,	Eagle Hotel,	4,800	
July 10th,	Eagle Hotel,	4,200	
July 11th,	Eagle Hotel,	50	1
July 12th,	Eagle Hotel,	70	
July 15th,	Eagle Hotel,	30	
July 16th,	Eagle Hotel,	20,000	
July 17th,	Eagle Hotel,	130	
July 19th,	Eagle Hotel,	3,000	
July 19th,	Eagle Hotel,	980	
July 22nd,	Eagle Hotel,	150	
July 23rd,	Eagle Hotel,	2,400	
July 24th,	Eagle Hotel,	30	
July 24th,	Eagle Hotel,	30	
July 29th,	Eagle Hotel,	25	
July 31st,	Eagle Hotel,	60	
June 25th,	No. 100 Market street,	1,100	
June 26th,	No. 100 Market street,	50	4
July 1st,	No. 100 Market street,	50	
July 2nd,	No. 100 Market street,	140	
July 4th,	No. 100 Market street,	700	5
July 4th,	No. 100 Market street,	40	
February 22nd,	No. 404 N. McKean street,	50	
March 4th,	No. 404 N. McKean street,	40	
March 7th,	No. 404 N. McKean street,	80	
March 11th,	No. 404 N. McKean street,		
March 15th,	No. 404 N. McKean street,	100	
March 25th,	No. 404 N. McKean street,	60	
March 31st,	No. 404 N. McKean street,	350	
April 15th,	No. 404 N. McKean street,	60	
April 28th,	No. 404 N. McKean street,	32,400	

TABLE NO. 7—Continued.

Date of Collection. 1907.	Place.	Bacteria per c. c.	
		Ordinary.	Colon.
January 30th,	Broadhead's Drug Store,	12	
March 1st,	Broadhead's Drug Store,	40	
March 15th,	Broadhead's Drug Store,	60	
January 17th,	Dr. McKee's residence,	16	
February 27th,	Dr. McKee's residence,	15	
May 25th,	Dr. McKee's residence,	80	
March 11th,	Hotel Vernon,	11	
April 15th,	Hotel Vernon,	7	
March 4th,	New Gilpin building,	40	
March 25th,	New Gilpin building,	60	
March 31st,	New Gilpin building,	2,400	
	MISCELLANEOUS.		
January 17th,	Court House,	84	
January 17th,	Public School,	70	
February 17th,	233 S. McKean Alley,	280	
February 17th,	315 Jacob street,	120	
February 22nd,	Burgess' Office,	15	
February 27th,	Corner Diamond street and Jefferson alley.	20	
February 27th,	Williams' Barber Shop,	25	
March 1st,	319 S. McKean alley,	30	
March 4th,	251 Mulberry street,	42	
March 4th,	Safe Deposit Building,	12	
March 7th,	Coherer Drug Store,	85	
March 7th,	129 Hamilton street,	200	
March 7th,	423 Reynolds avenue,	65	
March 11th,	272 S. Jefferson,	20	
March 11th,	319 S. McKean,	5	
March 11th,	Pennsylvania Depot,	10	
March 11th,	129 Campbell,	8	
March 15th,	154 S. Jefferson,	50	
March 25th,	333 Vine street,	350	
March 25th,	240 Chestnut street,	3,000	
March 31st,	304 Market street,	1,200	
March 31st,	Reynolds Hotel,	3,600	
March 31st,	150 N. McKean,	1,800	
April 15th,	310 Market street,	3	
April 15th,	114 S. McKean street,	16	
April 17th,	250 Market street,	12	
April 17th,	310 Market street,	12	
April 17th,	115 S. McKean street,	6	
April 23rd,	119 Diamond street,	700	
April 28th,	Gorgas Restaurant,	3,800	
April 28th,	Safe Deposit building,	12,000	
April 29th,	115 N. McKean street,	50	
April 29th,	119 Diamond street,	3,600	
June 30th,	114 S. McKean,	52	
June 30th,	Central Hotel,	18	2

Several samples were collected in Wickboro. Two were collected on January 17th, which showed no sewage pollution, but 160 water bacteria. One of these samples was collected at the public school and the other from the Orr Avenue Hotel. On February 1st and 2nd, respectively, samples were again taken from these places from the faucet on the water pipe. Four colon appeared in the school tap water and one in the hotel. On February 17th a sample of water collected at Wolf's store showed no colon.

CONCLUSION.

The Kittanning situation is an illustration of the risk which a community runs in voluntarily surrendering to a private corporation the ownership and management of a public utility upon which the health of the citizens of the town depends. A municipal plant may be managed by incompetent officers, but their removal from office is a quick accomplishment when public sentiment becomes aroused as to the criminal nature of any negligence in the discharge of the duties incident to operating a filter plant. While lack of appreciation of responsibilities or neglect to do the things requisite for properly safeguarding the public health by the officers of a water company is not a matter easily adjusted when the water company remains deaf to the demand for efficient service.

In either case the supervision of the operation of the plant by a disinterested party is called for. A water company is not likely to proceed in a negligent policy when its attention is called to the matter by the State Department of Health. In this instance at Kittanning, the water company responded promptly to the request of the State officials. However, the operation of the plant requires independent direction by someone accustomed to the work and fully alive to the responsibilities. Where sewage is discharged into the river at several points immediately above the water works intake it is certainly essential that the management of the water purification plant should be conducted in the most efficient and faithful manner.

TYPHOID FEVER AT SPANGLER.

A number of cases of typhoid fever occurred during the winter and spring months in the beginning of 1907 in the boroughs of Barnesboro and Spangler, Cambria county. In June, 1907, several cases of typhoid fever developed on the water-shed above the source of supply of the water to the public in said boroughs. The water works system is owned and operated by the Spangler Water Company and Barnesboro Water Company. The typhoid cases received the personal attention of Dr. W. E. Matthews, County Medical Inspector of Cambria county.

Spangler and Barnesboro are located in the mountains and in the bituminous coal fields. There are mining camps on the water-shed. The water company, at the time of the typhoid outbreak, placed the responsibility for contamination of the water supply upon the inhabitants resident on the water-shed. Mr. C. H. Cummings, Assistant Engineer, went to Spangler with written instructions to investigate and report fully about the extent and topography of the water-sheds, their occupation by railroad lines, dwellings, villages and generally as to sources of pollution thereon. He was instructed also to report the location, size and details of reservoirs and pipe lines, to make notes relative to the town sites, population, industries, general drainage and sewerage, public and private water supplies, consumption and demands for increased water supply. He was also to locate the typhoid fever on the maps of the water-sheds as well as the cases in the town and to report immediately the things necessary to be done to rid the water works system of all infection. The following reports has been taken in part from the text of Mr. Cumming's report:

GENERAL CONDITIONS.

The borough of Spangler and the borough of Barnesboro adjacent to the former on the north, are mining towns in the recently developed soft coal fields on the eastern slope of the Allegheny Mountains and in the valley of the West Branch of the Susquehanna River. The towns are in the north-western corner of Cambria county, twenty-two miles north of Johnstown, on the central branch of the Cambria and Clearfield Division of the Pennsylvania Railroad.

Spangler has a population of 2,500. It was 1,684 in 1900. Barnesboro has a population of 2,550. It was 1,616 in 1900. There are several small industries in Spangler. Coal mining and a small amount of farming furnishes occupation for by far the greater part of the population. The surrounding country is about one-half wooded and one-half under cultivation.

The West Branch of the Susquehanna River flows north-westerly through the boroughs of Spangler and Barnesboro. In the upper or southern end of Spangler, it is joined from the east by what is called the East Branch of the West Branch of the Susquehanna River. Above this junction, the streams have a drainage area of fifteen square miles, within which territory there are about twenty coal mines from which mine drainage is discharged to the streams. During its course through the boroughs below this junction, the river receives the drainage from twenty additional coal mines in and around the municipalities. On the drainage area above Spangler is a corner of Carrolltown borough, also several mining villages.

Within Spangler and Barnesboro, the West Branch of the Susquehanna River receives drainage from combined pubic sewers which carry off storm water and domestic sewage. These sewers serve a number but by no means the majority of the inhabitants of the two boroughs. There are a few cesspools in use. The general practice, however, comprises the use of earth privy vaults and the discharge of domestic waste water into the street gutters and natural water courses. Many of the privies are not well maintained and the majority of the street gutters and the streets as well are unpaved, so that the resulting conditions are extremely unsanitary.

WATER WORKS.

The Spangler Water Company was incorporated under the laws of the Commonwealth in 1892, previous to the incorporation of the borough, for the purpose of supplying the inhabitants of the village of Spangler with water for domestic and other purposes. The Barnesboro Water Company, a subsidiary corporation of the Spangler Water Company was incorporated under the laws of the Commonwealth in 1899 for the purpose of supplying water to the public in and adjacent to the borough of Barnesboro. The latter company took over a public system previously owned by the borough of Barnesboro. A Barnesboro Water Company, incorporated in 1896, was dissolved in 1900.

The Spangler Water Company supplies the water furnished to the public by both these companies. The supply is obtained from the East Branch of the West Branch of the Susquehanna at a point 4,500 feet upstream from Spangler.

Above the intake the stream has a drainage area of three square miles entirely within Carroll township. Nearly all of this area is under cultivation and supports a population of perhaps 1,500 inhabitants or about 500 per square mile. Up to the fall of 1907, mine drainage from four mine openings on the water-shed, namely Victor Numbers 3, 5, 6 and 10, was discharging into the streams. Ordinarily over 100 men were employed in these mines. Sanitary conveniences were absent, so that the mine drainage probably carried away excrementitious matter. Later in the season the drainage of one of these mines, namely, Victor Number 6, was altered so as to discharge the water beyond the drainage area tributary to the Spangler Water Company intake. Likewise, from Victor Number 2, the drainage is discharged beyond the area tributary to the water company's intake, although the mine opening is within this area. A branch of the New York Central and Hudson River Railroad winds through the hilly water-shed to all these mines. The coal is hauled northward from Spangler over the Pennsylvania Railroad tracks. No passenger service is afforded. The drainage from Victor Number 10 is discharged to the stream within a quarter of a mile of the water company's reservoir.

More than half the population on the water-shed is in the mining village, St. Benedict, located half a mile above and east of the Spangler reservoir. Most of the houses of the village are reported to be the property of the St. Benedict Village Company, and they are supplied with filtered water by the St. Benedict Water Company. The water company, village company and the Victor mines are reported to be the property of one individual. The village comprises a double row of houses ranged along a highway on the eastern and a highway on the western slope of a hill and coming together at the forks. The houses are provided with earth privy vaults and water is obtained from the St. Benedict Water Company's hydrants located outside at frequent intervals along the road. The houses on the eastern slope drain to one of the principal tributaries distant only a few hundred feet. Those on the western slope drain to a smaller tributary at a greater distance.

Foxburg village of about 200 inhabitants, extends eastward from St. Benedict for about 1,000 feet along a public road on the bank of one of the principal tributary streams. On many of the properties, the stream runs between the dwellings and the outbuildings.

Water is piped to several of the houses from a spring in the upper end of the village. This spring is walled and roofed so as to be reasonably well protected from surface contamination. A large majority of the inhabitants obtain their domestic water supply from individual wells, most of which are dug. Some of the people carry their water from unprotected springs which are suspicious sources of supply, owing to their liability to pollution by surface wash. Up to July, 1907, much waste water from Foxburg was allowed to drain to the streams in some cases directly through pipes. The streams were also subject to pollution by surface wash from around the earth privies which were the only sewage receptacles. The outlying farm buildings on the drainage area were also in many instances, sources of pollution.

For a half mile immediately above Spangler Water Company intake, the stream tumbles over a rocky course, through a wooded ravine where its banks are uninhabited. However, within this stretch the stream receives the drainage from Victor Number 10 and at the same point the piles of material exca-

vated from the mine line the banks. Here also, are the loading trestle, repair shop, stationary hauling engine and other appurtenances of the mine. Just below on the bank of the stream is the electric power station of the Northern Cambria Street Railway Company, the tracks of which, between Spangler and Patton, extend over the water-shed. Some oil wastes from the power station are discharged to the stream. There are no closets on the cars operated by the company.

At the intake the water company owns about five acres of ground on which is the reservoir with a capacity of about 4,000,000 gallons. The basin is formed by an earthern breast across the stream. The brest is paved on both slopes and provided with a masonry spillway. The reservoir has a maximum depth of about twenty feet at the breast while in the upper end there are considerable deposits of silt which are exposed when the surface of the water falls below the spillway. In July, 1907, there was a sign on the banks prohibiting trespassing, but no fence or other protection. The reservoir is provided with a twenty-four inch drain pipe and gate valve at the bottom of the center of the breast.

Close to the drain a twelve inch pipe with gates both inside and outside of the breast extends through the latter, being reported to end on the inside at elevation slightly above the end of the drain pipe. This twelve inch pipe furnishes the supply to the town, and reduces to a six inch pipe outside of the breast. This six inch pipe extends in a north-westerly direction for the most part in a public road through Carroll and Susquehanna townships a distance of 4,500 feet to the eastern Spangler borough line. Thence the six inch main extends the entire length of Spangler borough, in Bigler avenue, the main street, about 4,800 feet westerly and below this stretch about 9,000 feet northerly to Barnesboro. The main continues northerly a distance of 3,700 feet through the principal part of Barnesboro borough and to North Barnesboro, a considerable settlement in the same borough.

The population of the two towns is scattered along this main pipe line almost exclusively to the east of the river. However, the business section and principal part of Spangler is along the central part of the length of Bigler avenue.

The water company has about 550 consumers in this community. Another portion of the population is scattered in the northern part of Spangler adjacent to Barnesboro. In this community the water company has about 400 consumers. The principal part and business section of Barnesboro occupies a number of blocks in which the streets are laid out regularly. This community is in the southern part of the borough adjacent to Spangler and in it the water company has about 640 consumers. North Barnesboro lies about 1,000 feet further down stream. Athough the water pipe extends to this community which has a very considerable population, the water company here has only about sixty consumers.

Aside from the six inch main, the water works system in Spangler comprises 10,400 feet of three inch and four inch branch pipes and the Barnesboro system 7,600 feet of three inch and four inch branch pipes. On these branches there are a large number of dead ends and the entire system is provided with only three blow-offs, exclusive of the twenty-four inch flush pipe in the reservoir. However, there are a large number of fire hydrants connected with the water works system.

The elevation of the higher parts of Barnesboro supplied by the water company is only about 100 feet lower than the reservoir, and in these districts and the higher buildings in the central part of Barnesboro the water supply is often inadequate at times of maximum draft. During dry weather the yield of the water-shed is frequently insufficient to meet the demands of the consumption, and at such times what water there is consists principally of mine drainage.

During 1900, 1901 and one year between the latter and 1905, the reservoir supply was supplemented in order to meet the demands of the consumption for domestic purposes. This additional supply was pumped from the East Branch of the West Branch of the Susquehanna River, at a point in Spangler not far above the junction of this stream with the other branch and below a considerable section of town. A public sewer of the borough was constructed during 1906 discharging into the stream above this intake.

The pumping station is located on the north bank of the stream at the foot of South Eighth street. A four inch pipe extends from the six inch main in Bigler avenue to the pumping station and on beyond the pumping station to the tanks of the Pennsylvania Railroad south of the river. A ten inch intake pipe from the river terminates at the pumping station in an intake box in which the pump has a four inch suction. Connections around the pump permit of the railroad tanks being supplied with water from the gravity main during the time of minimum draft at night; or of the tanks being supplied by the pump during the day time, the connection with the gravity main being shut off; or of water being pumped from the stream into the pipe leading into the pipe supplying Barnesboro and Spangler.

TYPHOID FEVER.

During the first six months of 1907 there were twenty-six cases of typhoid fever in Spangler and five cases in Barnesboro as ascertained from the attending physicians. There are no records of these cases having been reported to this Department as required by law. The following table shows the distribution of the cases through the several months:

	Spangler.	Barnesboro.
January,	3	4
February,	4	0
March,	7	0
April,	0	0
May,	7	1
June,	5	0
July 3rd,	1	0
	27	5

The local physicians hold to the opinion that these cases of typhoid should not be attributed to infection from the local water supply except possibly in one or two instances. The small number of cases as compared with the total number of consumers of the water company and the fairly uniform distribution of the cases with respect to time seem to bear out this local conclusion.

There are reported to have been twenty-two cases of typhoid fever in the fall of 1906 in the southern part of Barnesboro and the northern part of Spangler. These cases were attributed to infection from what is known as Anderson's well, a private dug well more or less subject to pollution by surface drainage.

There were about 100 cases of typhoid in this same district in the summer and fall of 1902, so it is reported. There were also reported to have been six cases of typhoid fever on the water-shed about this time. No connection between the cases on the water-shed and those in the town was definitely established.

Typhoid fever is reported to be always more or less prevalent in Spangler and Barnesboro and the cases can usually be traced to individual springs or wells, of which there are a large number in use.

It is seen from these past records that the conditions during the first half of 1907 were not at all unusual. It could not be ascertained that there had been any typhoid fever on the water-shed of the Spangler Water Company for a year or more previous to May, 1907. At least eighteen cases had developed by this date in the community supplied with water by the Spangler Water Company.

In the latter part of May, the eldest son of Simon Link took up his abode in his father's residence in the lower part of Foxburg village on the north bank of the stream, one-half mile above Spangler reservoir. He quit work because of feeling unwell. He had been working on the tracks of the New York Central and Hudson River Railroad on the Spangler reservoir drainage area and boarding with Joe Springman, one-half mile above the reservoir. About June 4th, he saw Dr. Wheeling in his office in Spangler, after which Dr. Wheeling attended him at home and diagnosed his case as typhoid fever. A few days later a younger son, Ralph and a daughter of Simon Link developed light attacks of typhoid fever and were attended by Dr. Wheeling. Still later, June 23rd, Mrs. Simon Link had a light attack. All the patients were out of bed and about the property July 1st.

Up to the time of the outbreak of typhoid, sewage disposal at the Link property was accomplished by means of a six inch pipe for kitchen waste and wash water, extending from the house to the stream. A plank lined privy vault on the bank above the elevation of the stream and only twelve feet from it, received excrement. The typhoid fever patients used this privy vault more or less previous to the diagnosing of the several cases of the disease. About June 15th the water company, in an effort to protect its supply, had a hole dug on the Link property about four feet square, three feet deep and thirty feet from the stream, and in this hole at least some of the discharges of the patients and waste incident to their care were deposited.

WATER-SHED IMPROVEMENT.

On June 27th, Simon Link was verbally ordered to discontinue the discharge of all of the waste water into the stream, to remove the pipe, to remove and disinfect the contents of the privy and bury it below the surface of the ground

at a point whence it could not possibly wash into any stream and to abandon the privy at the site which it then occupied. The hole dug by the water company was disinfected with quick lime and as there was practically nothing in it but water, it was filled up as soon as a safer method of disposal could be provided for the waste water from the house. In order to expedite matters, the water company furnished a man to help Mr. Link. A concrete privy vault protected from surface wash was constructed twenty-five feet from the stream, about the greatest distance attainable on the property. Thereupon the contents of the old privy, reported by Dr. Matthews to have been thoroughly disinfected, were removed to a point about 1,000 feet from the stream and buried below the surface. The ground in the vicinity of this site, where some of the privy contents had become scattered, was carefully ploughed under. A layer of quick lime was placed in the old privy vault and it was filled up. The six inch pipe from the house to the creek was removed, and, to take care of the waste water, a percolating cesspool was constructed, five feet deep and four feet in diameter at the greatest distance attainable from the creek and was banked to keep out surface water. This cesspool extended into rock, more or less seamed, and it could not be safely asserted that it would satisfactorily dispose of waste water or indeed that it would dispose of it at all. However, Mr. Link was willing to try this means of disposing of his waste water as any other method would have involved a greater expense. Although these changes were not finally completed until July 16, a careful watch had been kept on the property in the mean time and the occupants had, it is believed, complied with all the orders of the Department, although tardily.

On July 12th, 1907, another case of typhoid fever which had just developed on the Spangler Water Company's water-shed came to the attention of the Department. This was in the person of a young Slavish woman living in one of the St. Benedict Village Company's houses, the third one north of Foxburg in the most western row of houses in the village. There were also in the house the woman's husband, a boy about twelve years old and several boarders. All the boarders left at once. Dr. Matthews failed in an effort to persuade the woman to go to a hospital. The officials of the village company were eager to follow all the Departments's suggestions. The patient's discharges were properly disinfected and deposited with lime in a water-tight cask, and were afterwards properly buried. A hole was dug into which all the waste water from the house was thrown. This hole was ample in size, protected from surface wash and at some distance from the nearest stream, and its contents were frequently disinfected. A concrete privy vault was constructed for the future use of the inhabitants of this house. The contents of the old privy vault were thoroughly disinfected with a large quantity of quick lime, sufficient to make a stiff mass of the liquid and the contents were then properly disposed of. These improvements were completed the week following the development of the case. The patient was confined to her bed only a few days, although all the symptoms of typhoid were present.

The Department proceeded to clean up the entire water-shed. Field Inspector J. B. Nightingale was there from June 26th to October 21st. Verbal orders were given, and twenty written notices signed by the Commissioner of Health were served, requiring changes in the methods of sewage disposal and drainage on various properties on the water-shed. In all, 492 alterations were made, including the building of fifty-four cesspools, ninety-eight earthern vaults, thirteen cement privy vaults, 400 feet of twelve inch pipe drain to divert spring water from the vicinity of privies and the destruction of eleven pigpens and cow stables.

CONCLUSION.

Had there been no change in the method of sewage disposal at the Link property after the outbreak of typhoid fever and had the drain to the creek continued in use and had the old privy vault continued to be used and not disinfected, undoubtedly typhoid infection would have reached the source of water supply to Spangler and Barnesboro and a serious epidemic of the disease might have resulted in these towns. The case serves to illustrate the extreme importance of all typhoid fever cases being promptly reported through the proper channels to the Department. The stream is not a fit source of supply of water for the public in its present condition and it does not appear that there is sufficient water available to warrant the installation of a filter. The water company has from time to time contemplated the introduction of a more suitable supply from a different source and is now engaged in preparing plans to submit to the Commissioner of Health for approval.

TYPHOID FEVER AT MANHEIM.

On June 24th, 1907, a petition relative to typhoid in the borough of Manheim, Lancaster county, was received by this Department which was headed as follows:

"PETITION TO THE STATE BOARD OF HEALTH,

Through the BOARD OF HEALH, of Manheim, Pa.

We the undersigned subscribers, and residents of the borough of Manheim, Lancaster county, Pennsylvania, on account of the annual epidemic of typhoid fever, which during the present season has reached the large proportion of over thirty cases in this town of a little more than two thousand population, and at present, May 28th, 1907, manifests no tendency to cessation: * * * * Respectfully petition the State Board of Health to make such investigation of the borough water supply or other possible occasion of disease to afford relief from the present strained conditions."

This petition was accompanied by a letter from A. E. Cooper from which the following is an abstract:

"You will note that the petiton is headed as made through the local Board of Health. I have conferred with the Secretary of said Board (Dr. Biemensderfer) and he refuses to be identified with the petition."

The petition was signed by two physicians, J. Francis Dunlap, J. D. Hershey and 117 representative citizens of the borough. The local Board of Health refused to accept any responsibility for the petition.

Officers of the Engineering Division of the State Department of Health were detailed to make an investigation of the water works system. A description of the town and the water works and a sanitary survey of the water-shed is set forth in the following report. The County Medical Inspector, Dr. M. W. Raub, of Lancaster had kept in touch with the situation and assisted Assistant Engineer Shaw, who directed the investigations.

MANHEIM BOROUGH.

Manheim borough is located in the north-west part of Lancaster county about ten miles north-west of the city of Lancaster. The borough is bounded on the north-west and south-west by Rapho township and easterly and southerly by Penn township from which it is separated by the Big Chickies Creek which empties into the Susquehanna River about two miles above Columbia and about one mile below Marietta. The borough is located about twelve miles above the mouth of the creek. Manheim is connected by trolley with Lancaster and is also on the Columbia and Wilmington Branch of the Philadelphia and Reading Railroad.

The borough has a present population of about 2,100 in 1890 it was 2,070 and in 1900 it was 2,019. It has an area of 412½ acres, about 175 of which have been built up.

There are eight important industries employing 325 hands. The Manheim Shirt Company employes fifty people, uses public water and has surface closets. The Bond Foundry and Machine Company employes twenty-five people, uses public water and has surface closets for help and flush closets in office, draining to a cesspool. The Hershey Machine and Foundry Company employs fifty-five people, uses public water and has surface closets. (Two cases of typhoid occurred during 1907 among employes of this firm). The Manheim Knitting Mills employes twenty people, uses public water and has surface closets. The Kinports Cigar Manufacturing Company employs fifty people, uses public water and has surface closets. The Manheim Hosiery Mills employs forty-five people, uses public water and has surface closets. And the Manheim Pantaloon Factory employes forty-two people, uses public water and has surface closets.

The town is built upon a comparatively level stretch of land, sloping gently towards Big Chickies Creek, the built-up portion lying chiefly between elevations 395 and 425 above sea level. The soil is clayey and the underlying rock limestone.

Main street runs in a north-easterly direction and Charlotte and Prussian streets, the two other important streets, are laid out at right angles to Main street. These three streets are macadamized and have various kinds of curbs, gutters and sidewalks.

The natural drainage is into Big Chickies Creek and there is no apparent trouble in disposing of storm water by surface drains and gutters.

SEWERAGE.

The borough has no public sewers. Two private sewers only could be located. These extend from properties on Prussian street between Stiegel and Railroad avenue, discharge into the creek and are owned by Samuel Hostetter and W. E. Keeney.

SANITARY CONDITIONS.

The sanitary conditions of the town appear to be good as far as the condition of the streets is concerned, but a detailed inspection of the various properties showed that a greater portion of the people use surface closets, while many abandoned wells and cisterns are used as cesspools, adjoining wells being used as a source of water supply. An inspection of 456 properties in the borough gives the following results: Three hundred and forty-nine use the public water supply, 102 use well water, six use both and two are supplied by cisterns. There are 355 surface privies, 169 cesspools, thirty-eight wells and cisterns used as cesspools and ninety-five properties provided with bath, and water closets.

WATER WORKS.

The borough is supplied with water by the Manheim Water Company, a corporation whose charter is dated October 7th, 1884. The charter territory is Manheim borough. The system was installed about twenty years ago and it has been in operation ever since.

The source of supply is Reiffs Run, a tributary of Big Chickies Creek. This stream rises in the hills about three miles north-west of Manheim and empties into Big Chickies Creek about one-half mile below the borough line. The stream has two main branches, each about 2 miles in length. These unite about one-half mile above the intake dam, which is about three-fourths of a mile above the outlet into the creek.

The intake dam, settling reservoir and pumping station of the water company is located just above the point where Reiffs Run crosses the Old Line Turnpike. There is a small island in the stream at this point and small timber dams have been constructed to collect the water. From the creek the water is led through a twelve inch cast iron pipe provided with a gate to a settling basin about sixty feet by forty feet and eight feet deep. This basin has a capacity of about 150,000 gallons, has roughly paved slopes and is provided with a twelve inch cast iron pipe overflow but no means is provided for draining. From the basin a twelve inch terra cotta pipe leads the water to a pump well inside the pumping station. This well is fourteen feet deep, six feet in diameter, is lined with brick, plastered with cement and has a rock bottom, which is reported to be water tight.

The pumping station contains one boiler and one three cylinder geared pump of the Gould make, belt connected to a twelve H. P. motor. The pump cylinders are eight inches in diameter, have an eight inch stroke and the pump makes fifty revolutions per minute and is reported to have a capacity of about 250 gallons per minute or 360,000 gallons per twenty-four hours. As this pump is old and somewhat out of repair it is doubtful if this capacity is reached. There is also a Worthington duplex compound pumping engine having an eight inch high pressure cylinder, twelve inch low pressure cylinder, eight and one-half inch water cylinder and ten inch stroke. This pump is operated at a speed of forty-four revolutions per minute and is reported to have a capacity of 600,000 gallons per twenty-four hours. This pump is in about the same condition as the other, and is used only when the electric pump is out of service. The electric pump is used at night only and during the period of maximum consumption is operated about eight hours.

During the summer of 1900 the water supply became insufficient and two six inch wells were driven at the pumping station, one to the depth of 1,222 feet and the other to a depth of 552 feet, but no water was obtained.

The pumps discharge into an eight inch cast iron main 1,458 feet in length extending to a reservoir north-east of the pumping station and north-west of the borough. This reservoir is located on a hill 500 feet north-west of the borough line and 1,000 feet north-west of the corner of Colebrook street and Alley M. This reservoir has earth embankments and is lined with brick laid in cement. It is 130 feet square, has an area of 17,000 square feet, is fifteen feet deep and has a capacity of about 1,360,000 gallons. The elevation of the top of the reservoir is 538 and the low water level is at elevation 525.

At the foot of the reservoir embankment the force main is divided into two branches. One branch enters the reservoir at the top and is used for filling it during the summer time; the other branch is connected with the supply main to town, and also feeds the reservoir through a standpipe entering the reservoir about eighteen inches above the bottom. This standpipe also supplies the town when the pumps are not in service. There is a sump well in the bottom of the reservoir which is connected to a blow-off pipe. A small gate-house is located at the foot of the reservoir embankment which contains gates on supply main and blow-off pipe. The gates are so arranged that the town can be supplied by direct pumping or from the reservoir. The reservoir is enclosed by a picket fence and no surface water can enter. At the time of inspection the water was very cloudy and was filled with water plants, algae, fish and frogs.

The reservoir is connected with the distribution system by an eight inch cast iron main which extends down Alley M to Colebrook street, where it connects with the six inch mains of the distribution system. The distribution system including the mains of the reservoir containing eighteen one-hundredths of a mile eight inch main, one and sixty-four one-hundredths miles six inch, seventy-eight one-hundredths miles four inch and one and eighteen one-hundredths miles of three inch making a total of three and seventy-eight one-hundredths miles. There is some one and one-half inch pipe not definitely located. There are two blow-offs about sixty fire plugs and about 355 service connections on the system. The system supplies about 1,775 people, the minimum consumption is about 62,500 gallons per day and the maximum about 125,000 gallons per day, giving a maximum consumption of about seventy gallons per capita. There are 102 families using well water.

The Superintendent stated that the blow-off valves are opened once a month for the purpose of flushing the distribution system. The reservoir is reported to have been cleaned in September, 1905 and also in 1901.

WATER-SHED.

Reiffs Run above the intake dam has a water-shed of six square miles, composed almost entirely of farming country. There are eighty-two occupied properties on this drainage area, and a population of 358. Each property was carefully inspected, and all of them found satisfactory except in nine instances. Written notices for abatement of nuisances were issued in each one of these nine cases. Two of them were referred to Honorable W. U. Hensel, of Lancaster, with instructions to prosecute the offenders. The menaces on the other properties were abated according to the report of the inspector. On the nine estates there were five privies which were the source of pollution of State waters. Two of these had to be placed in the hands of the lawyer above mentioned. The other four nuisances were pigpen drainage and one creamery.

The Dunkard Home for the Homeless is located between the two main branches of the creek just above the junction and about 2,500 feet above the water works intake. This institution has a large home building, with barns and outbuildings and contained about forty inmates at the time of inspection.

The institution is supplied with drinking water by a well near the house, the water for washing, etc., being pumped from the west branch of the run. It is probable that this water is also used to some extent for drinking purposes. The drainage from the barnyard and pigpen flows through a ditch to the west branch of the run which it enters immediately above the intake leading to the pump well of the institution's supply. The sewage from the kitchen and laundry is led to a cesspool which overflows into the run just below this intake. The sewage from water closets is conducted to a cesspool about seventy-five feet from the North Branch of the run. This cesspool is thirteen feet by eight feet and is covered by a roof. On the day of the Department's inspection the cesspool was filled up to within eleven inches of the top. The walls are of rubble masonry and the bottom is earth. There is a blind drain connected with the cesspool which extends both above and below the cesspool in a line parallel with the run and about seventy feet from it. This cesspool is reported to overflow in the winter time and the contents probably reach the run at all times as the soil is shaley and full of water.

There are two privies located between the institution and the cesspool about 100 feet from the North Branch of the run. The contents of these privies is reported to be hauled out in winter and deposited on the hillside near the stream. There is an old mill race between this point and the stream which is supposed to intercept the surface water but in time of heavy rains, the surface drainage could easily reach the stream.

The institution officers received instructions from the Department's representatives about making changes to prevent any pollution of the stream and guaranteed verbally to carry out these instructions. The institution recently purchased a right of way for pipe line to springs on the West Branch with the intention of installing a gravity supply of water. The water company endeavored to prevent the construction of this line through the courts but failed to obtain an injunction.

TYPHOID FEVER.

Typhoid fever epidemics have occurred during the spring of the years 1904, 1905, 1906 and 1907. It is reported that these epidemics begin just after the spring freshets. It is also reported that there are frequent cases of typhoid on the water-shed, but the Department's inspection revealed but three cases during the last ten years, one of which has occurred since the 1907 epidemic and the other two in other years. The case during the current year was on the edge of the water-shed far removed from any stream, and the stools were thoroughly disinfected.

It could not be ascertained that any case had ever occurred at the Dunkard Home.

The following is a record of the typhoid occurring in the borough during the last four years:

1904,	28 cases.
1905,	19 "
1906,	20 "
1907,	26 "
Total,	93 cases.

None of these cases were reported to the State Department of Health. Of the above cases eighty-two used public water and eleven used well water. Of the eleven cases, five were possibly caused by the use of one well located in the south-eastern part of the town. The borough school house receives its water supply from the Manheim Water Company. Many of the ninety-three cases were among children. It is reported that there had been no typhoid in Manheim previous to the construction of the Dunkard Home in 1899 and very little until 1904. The conditions at this home were the subject of a report in 1904 by Dr. Raub, County Medical Inspector of Lancaster county as follows: (See page 134, Pennsylvania Report of the State Board of Health for 1904-05.)

"Inspections at the Dunkard Home, Manheim, Pa., on account of Typhoid Fever.

"Lancaster, April 13, 1904.

"In obedience to your instructions of the 11th inst., I went to Manheim on the afternoon of the 12th and carefully inspected the Dunkard Home. This Home is located about three-fourths of a mile north-west of the borough of Manheim, on an elevated angle on an elevation of about forty feet above the surrounding grounds, and in an angle formed by the union of the streams uniting and furnishing the water supply of the borough for domestic use. The home is located as to convey all drainage directly into cesspools on either side of the premises. About one hundred feet from the northern exposure of the home is a pool at the foot of the hill and partly surrounded by low swampy grounds which communicate almost directly with the stream. I found the pool completely filled, the contents being from the flush closets from the home, and the surrounding grounds saturated and polluted with overflow. On the south side is another pool into which is conveyed the drainage from the washroom and kitchen, this is overflowing and has saturated the marshy grounds and communicates directly with the stream on the side. I consider this all unsanitary and dangerous, and must contaminate the water.

"The premises are thoroughly sanitary and are occupied at present by forty patients.

"No sickness but some colds at present, and am informed by attending physicians that in many years of their attendance no cases of typhoid fever has come to their notice.

"While from the pollution of the grounds as overflow and filtration from these cesspools we must conclude that these streams at frequent times are dangerously contaminated, yet we have no room to attribute the typhoid condition in Manheim to the Dunkard's Home."

The Department of Vital Statistics has no record of typhoid in Manheim during the years 1904, 1905, 1906 and 1907. On July 3rd, 1907, the Department addressed a letter to the President of the local Board of Health calling his attention to the absence of reports on typhoid and also calling his attention to the present sanitary conditions of the borough and of the water-shed. Two letters were received in reply, both of which stated that the local physicians failed to report typhoid cases to the local Board of Health, therefore, rather than to render inaccurate reports to the Department, they refrained from making any. These letters were signed by Israel Reist, President of the local board and by J. S. Biemensderfer, Secretary.

On August 7th, 1907, the following letter was addressed to local physicians by the Commissioner of Health:

"Dear Sir:—Enclosed please find copy of letter addressed to the President of the Manheim Board of Health. In reply to this letter the Department is informed that certain local physicians have refused to report cases of communicable diseases even after repeated requests from the Board of Health. Will you kindly inform me if you have furnished the information requested by the local Board of Health and if not, why you have failed to comply with the law.

"I would also request to be informed of any cases of typhoid fever which have occurred in the water-shed of the stream used as a source of supply by the Manheim Water Company during the last five years.

"Very truly yours,"

This letter was sent to the following physicians: Jacob D. Hershey, Frank F. Franz, Henry D. Rosenberger, S. S. Brecht, Francis J. Dunlap, John S. Beamensderfer. Messrs. Dunlap and Hershey replied, stating that they had reported to the local Board of Health, and Dr. Beamensderfer dodged the question and stated that he had resigned as Secretary and thought that the whole board would resign.

ICE SUPPLY.

The borough is supplied with ice from two ponds located as follows:

One is located about one-fourth mile west of Manheim, along the Manheim-Sporting Hill turnpike. It is owned by John B. Shreiner, who resides in the borough of Manheim. The capacity of the ice house is about 200 tons. The pond if formed by damming Reiff's Run about one-half mile below the water works intake and is subject to the same pollution as the water supply. It is reported that this pond has not been drained for several years and that the water is highly colored. Ice from this pond is sold to the citizens of Manheim and used for all purposes. This year's supply became exhausted about September 1st since which time a supply of artificial ice has been obtained from Lancaster.

The other ice pond is located just below a picnic ground known as Kauffman's Park situated south of Manheim on the line of the trolley road to Lancaster and much frequented by picnics from that city.

This pond is fed by three small springs located in the park. It receives surface water from the highway and park grounds, also surface water flowing through a privy and dish water from the park kitchen and restaurant.

The capacity of the house is 900 tons.

The pond is owned by Moses H. Snavely, who leases ice privileges to different parties who sell the ice to the citizens of Manheim for all purposes.

It is reported that the pond has not been drained for several years and that the water is highly colored.

DISCUSSION.

Previous to the petition of June 24th, 1907, the only record of typhoid in the borough is the report of Dr. Raub dated April 15th, 1904. This report indicates that the conditions at the Dunkard Home were such as to pollute the water supply but does not find any indications of typhoid.

The epidemics of the last four years may have been due to two principal causes, one of which is a polluted water supply furnished by the Manheim Water Company, the other, the use of well water polluted by adjacent cesspools. The occurrence of these epidemics every spring should have led the water company to suspect its source of supply and also have led the local Board of Health to suspect the well water especially in the south-eastern section of the town where numerous cases occurred where well water was used.

The water company had not, at the time of the petition, filed any plans or information with the Department relative to the system, but it at once commenced surveys of the water-shed and at the present time has filed complete maps of the entire works. The company has been recently organized and is now controlled by people who profess a desire to improve the system.

The most serious pollution of the stream is by the Dunkard Home. This may be partially remedied by the construction of a large cesspool which should receive all waste water from the institution. This cesspool located in porous soil would probably dispose of the nuisance temporarily, but there would still be a possibility of contamination of the stream or some of the numerous springs feeding it. The sewage from the institution could be piped to a point below the water works intake but this would be simply transferring it down stream and would still pollute the ice supply of the borough. There is plenty of elevation for the construction of a small disposal plant at the institution. The other pollutions in the water-shed can be remedied from time to time by the exercise of good judgment but there will always be danger of pollution through the ignorance and carelessness of the people.

The safe method of procuring a satisfactory supply of water for the borough under present arrangement, will be for the water company to install a filter plant. The local Board of Health should forbid the use of contaminated well water.

In considering the question of the filtration of the present water supply, the company would also have to take into account the adequacy of the supply. The probable yield of the water-shed during a series of dry years and the probable increase in consumption in the borough which would be augmented considerably were a sewer system to be installed, should be taken into account. The borough at the present time is not financially able to build a sewer system and disposal works. The sewage should not be discharged untreated into a stream and therefore the problem of household disposal of wastes is the one which confronts the community instead of a municipal problem of sewage disposal. The

proximity of cesspools to wells is a serious matter and the local Board of Health should be active in making examinations and closing up all such wells as are found to be contaminated. Furthermore, watertight receptacles for sewage and waste water should be ordered built and when the receptacle is filled up the contents should be removed and disposed of in a sanitary and harmless manner. This expense must be borne by the individual, but it is better that this should be done than that an epidemic should sweep the borough with fatality.

Possibly a private corporation might be induced to build a sewer system and disposal plant under contract, whereby ultimately the plant would become the property of the borough when the place attained a size and financial ability to purchase the works.

It is a fact that the filtration of the public supply which is the duty of the water company, will not garrison the town against an invasion of epidemic so long as the present method of sewage disposal and use of ground water for drinking in the borough prevail.

CONCLUSIONS.

The Department understands that the water company is preparing plans for the filtration of its water supply.

It also understands that the local Board of Health will consider the suggestions herein made relative to improvements in the borough.

TYPHOID FEVER AT EAST CONEMAUGH AND FRANKLIN.

In August, 1907, a number of cases of typhoid fever developed in the territory supplied by the Conemaugh and Franklin Water Company. Officers of the Medical and Engineering Divisions of the State Department of Health were detailed to examine into the cause of the outbreak. The investigation was made beginning August 24th. At that time twenty cases of typhoid fever were reported in the water district. The operations of the Engineering Division were confined to the inspection of the water works, the sterilization of the water of the reservoir and the inspection of the water-shed and abatement of nuisances therein. It was concluded that the water supply was the medium of transmission of the infection. An important lesson is taught by the fact. The following report gives in detail all the circumstances respecting the water works:

GENERAL CONDITIONS.

East Conemaugh borough, having a population of 2,175 in 1900 and 1,158 ten years before, is located on the north bank of the Little Conemaugh River; and Franklin borough, having a population of 961 in 1900 and 662 ten years before is located on the south side of Little Conemaugh River opposite East Conemaugh. East Conemaugh is on the main line of the Pennsylvania Railroad and immediately east of the city of Johnstown, all in Cambria county. The Franklin plant of the Cambria Steel Company is located in the lower part of Franklin borough and furnishes employment to a considerable number of citizens of both boroughs. In fact, because here the valley of the river is narrow and side hills rise steeply from the river bank, the two towns are one community.

SEWERAGE.

In East Conemaugh there is a sewer system having a brick outlet four feet in diameter discharging into a ditch 200 feet above the highway bridge connecting the two boroughs which outlet is at the intersection of Cherry and Railroad streets. The ditch extends along the railroad tracks through the lower part of the town to the river. Numerous small sewers discharge into this ditch and the nuisance created thereby has been the subject of a State Department of Health.

There are several drilled wells and quite a number of dug wells and springs used throughout the borough as sources of domestic water supply on individual estates. The majority of the inhabitants take the public water supply.

Outhouses are in general use, although a large number of the privies are reported to be connected with the sewer system. If care were exercised to always use the sewer as the depository for wash water and sink drainage besides sewage, the danger from surface pollution of the dug wells and springs would be correspondingly reduced.

In Franklin borough there is a pipe sewer system, a part of which has been constructed since 1905 without the approval of the State Department of Health. There are reported to be three outlets, ten inches, fifteen inches and eighteen inches in diameter. Each sewer discharges into Clapboard Run which flows into the Little Conemaugh River from the south in the eastern part of the borough.

There are also reported to be a fifteen inch sewer outlet and two eighteen inch sewer outlets into the river in the lower part of the borough. The Little Conemaugh River flowing in a westerly direction on its course through Johnstown and other places to the Allegheny River.

Two drilled wells and a few dug wells and springs are used for drinking water. As in the case of East Conemaugh, privies are in very general use and they are connected to the sewers with a few exceptions. The water company is reported to supply 135 dwellings in Franklin and 450 dwellings in East Conemaugh. It is thus seen that there is need of sewers in the water district.

WATER WORKS.

The Conemaugh and Franklin Water Company was formed in 1907 by the merger of the old Conemaugh and Franklin Water Company and the Maple Water Company which previously supplied East Conemaugh borough and Franklin borough respectively.

The supply is obtained from Clapboard Run. There is a reservoir of about 2,000,000 gallons capacity in the valley of the run one and one-half miles south of Franklin. The site of the basin is in a deep narrow ravine. Across this ravine there is an earth embankment dam about 100 feet long and twenty feet high. Around one end of it, excavated in the rock is the waste way for the discharge of surplus water drainage from the water-shed. The storage reservoir is about 150 feet long and beginning at the waste way there is a masonry wall comprising the eastern side which forms one side of the channel and the excavated rock froms the other side of the channel of the waste way by means of which the yield of the water-shed may be entirely passed around the reservoir into the run below.

Through this side wall at the upper end there are two ten inch inlet pipes and through the wall near the dam there are two ten inch overflow pipes. The former are provided with gate valves. Water might back-flood into the reservoir from the flood channel in case of very high water because there are no valves on the ten inch overflow pipes. During all ordinary times the only inlet into the reservoir is by one or both of the upper pipes.

Near the dam in the reservoir is a substantial masonry intake chamber. There is one inlet to the chamber and it is at the bottom on the side. The opening is protected by a double screen and controlled by a sluice gate. The town's supply pipe starts from the masonry chamber at the bottom and extending through the dam passes to a masonry valve house at the toe of the dam on the down stream side.

There are two twenty inch drain pipes embedded in the masonry foundation of the inlet chamber. They extend through the dam and have gates on them whose stems extends vertically into the valve house above mentioned. Below this house the two drain pipes discharge into the run, their outlets being about 130 feet long and three feet lower than their inlets in the reservoir.

The bottom of the inlet chamber is about four feet above the bottom of the reservoir.

From the valve house the ten inch supply main extends down the valley for about 3,400 feet where it reduces to eight inches in diameter and extends a distance of 3,400 feet to Franklin borough, thence through the borough it connects with East Conemaugh. The distributing system in the latter place comprises about three miles of pipe and that in Franklin borough about one mile.

The storage reservoir is elevated about 400 feet above the towns. The pressure on the distributing systems has to be reduced. This is accomplished by means of a reducing valve located on the gravity main.

Fire protection is afforded and the system may be drained through the hydrants. The number of dead ends in the system is not known because the water company has failed to file maps of its system in the Department's office.

WATER-SHED INSPECTION.

There is a water-shed of three and three-tenths square miles above the reservoir. On this area there are forty occupied properties on which reside 178 people. For about a mile above the reservoir the run is in a narrow, steep sided valley. And up this ravine along the banks of the stream there is a private way not much used and on this way there are several dwellings.

Above the ravine on the table lands, the water-shed broadens out and contains numerous farms and public roads. The upper half of the water-shed is in Richland township and the lower half in Conemaugh township.

One hundred and eighteen cattle, ninety-eight hogs and sixty-five horses were found at the said forty estates. Twenty-two of the properties were found in a satisfactory condition, but on eighteen of them nuisances were located. For the abatement of these nuisances eighteen written notices were served covering thirty-three stream pollutions of which thirteen were by privies or cesspools, four were by private sewers, two by barnyard drainage, seven by pigpen drainage and nine by manure piles. At the close of the year only two pollutions remained unabated.

It was ascertained that at least two cases of typhoid fever had occurred on the water-shed during the past ten years.

Immediately above the reservoir and with several hundred feet thereof, about 100 feet from the run, there are three occupied dwellings.

TYPHOID POLLUTION OF THE WATER SUPPLY.

Dr. A. B. Moulton, Assistant Medical Inspector made a report of his visit to Franklin and Conemaugh on Saturday, August 24th. The following excerpts have been taken from his report:

"Twenty cases of typhoid fever had been reported in these two boroughs during the past week but no new cases had developed in the three days prior to my visit according to the statement of Dr. Bralier, President of the Board of Health of Conemaugh and physician for the Board of Health in Franklin. The boroughs were well placarded with notices advising the people to boil all water and milk intended for domestic use and lime was being freely used for the disinfection of privy vaults as well as for the discharges of typhoid patients. The houses in which cases had occurred were placarded and the circular setting forth the precautions to be observed as advised by the Department of Health, had been left in each household.

"On visiting the water-shed, owing to a heavy rain which had occurred during the night and day previous, the water was roily and rising rapidly. Just above the reservoir some fifty or seventy-five feet, a little runway enters the creek and within ten feet of this runway was a large acccumulation of manure, washings from which would find their way into the creek and thence into the reservoir.

"Within twenty feet of this runway had been located the privy with a depression beneath into which the discharges from the typhoid patient Miss Edna M. Hare had been deposited prior to her removal to the Johnstown Hospital about July 20th. Instructions had been given that the contents of this vault should be drawn, mixed with lime, and buried at a distance of at least 150 feet of any stream or any other source of water supply, a new watertight valut being constructed for this privy. Upon investigation I found that the contents of the vault had not been removed and that it had simply been covered up with coal ashes and common dirt. A cement vault was in the process of construction at a point fifty feet further down the road and on a runway which passed by the reservoir below the dam. Orders were given that this pit should be immediately cleaned out, its contents limed and buried as above indicated and the vault and ground around it to be thoroughly limed. This was done the following day.

Miss Hare resided in the upper one of the three dwellings located immediately above the water company's reservoir. It is reported that within two days after the case was diagnosed as typhoid fever, the girl was removed to the Johnstown Hospital.

For the short time of her sickness prior to the removal, no precaution had been taken to keep wash water out of the run. Either the wash water from the house or pollution from the privy might have reached the stream.

The consumption in the water district is about 300,000 gallons per day so that the storage capacity is equivalent to about seven days. As the reservoir is usually operated, the inlet valves are closed while the water of the stream is turbin unless it be during a dry period and scarcity of water. Up to the epidemic threatened, there had been an abundance of flow in the run and by far most of the water had by-passed the reservoir and gone on its course down the ravine. Owing to this fact and to the fact that the currents in the reservoir are produced by the draft of water out of the outlet chamber, assuring slow velocities and a long period of retention in the basin, may be attributed the escape by the consumers in the water district of an appalling typhoid fever epidemic.

According to the meager reports it took from the latter 3rd of July until about the 1st of August for a little and weak infection to arrive in the houses in the towns and between ten days and two weeks thereafter the onset of twenty cases appeared. No other cases were reported.

REMEDIES.

Besides the providing of masonry vaults at the three dwellings immediately above the reservoir, and besides the permanent improvement of the water-shed hereinbefore described, the Assistant Engineer, Mr. C. H. Cummings, personally directed the introduction of copper sulphate at the reservoir. One part per million was applied. As soon as arrangements could be made, the fire hydrants in the town were opened and also the faucets in the houses and in this manner the system was flushed and drained. To complete the emptying of the reservoir, the two twenty inch drain pipes were opened and the water was wasted into Clapboard Run. The day following the reservoir was filled with new water.

CONCLUSION.

The experience of the State Department of Health during the Nanticoke epidemic of 1905 where the Newport storage reservoir intercepted the infection and saved Glen Lion from the epidemic which was raging on the other side of the reservoir in Nanticoke, confirmed to a remarkable degree the proposition that sedimentation is a natural barrier to the spread of water-borne infection.

It follows, therefore, if the pollutions are settled out that the bottom or a reservoir is the most dangerous part from which to draw the water. Perhaps had the intake at the outlet chamber at the Clapboard Run reservoir been located at the top instead of at the bottom there would have been no infection whatsoever of the water delivered into the town pipes and no typhoid fever. It seemed quite probable that this would have been the fact.

The important lesson taught is that the arrangement at a gate house should admit of the possibility of drawing the water to be supplied for town purposes from or near the surface of the reservoir. And the water should be drawn from the surface, unless there are good reasons to the contrary.

TYPHOID AT RIDGWAY.

Under date of August 14th, 1907, the existence of typhoid fever to the extent of an epidemic in the borough of Ridgway, Elk County, Pennsylvania, was reported to the Commissioner of Health by the County Commissioner of Elk County. The records of the Bureau of Vital Statistics of the State Department of Health fail to show the existence of typhoid fever at Ridgway. Moreover, copies of plans and surveys and descriptions of existing water works and sewerage facilities of Ridgway were not on file in the office of the Commissioner of Health as required by law. Thus handicapped by lack of information, the Commissioner of Health was forced to send representatives into the field to ascertain the facts. Dr. A. B. Moulton, Assistant Medical Inspector was detailed to investigate the situation, and the Chief Engineer of the Department was instructed to personally examine the public water works and private sources of supply, to investigate methods of sewage disposal and to report with recommendations to the Commissioner of Health relative to permanent improvements to the systems if improvements were found to be necessary to obviate a recurrence of a water-borne disease. He was also to render ready assistance while on the ground to Dr. Moulton.

The public water works supply was condemned and numerous private sources of supply and various orders were issued by the Commissioner of Health in relation thereto, all of which is set forth in the following report.

GENERAL CONDITIONS.

Ridgway is a substantial and wealthy residential and manufacturing community of about 6,700 inhabitants, located on the main line of the Philadelphia and Erie Division of the Pennsylvania Railroad system and on the Buffalo, Rochester and Pittsburg Railroad, in the valley of the Clarion River at the confluence of the river and Elk Creek.

It is the county seat and the largest and most important of the three incorporated municipalities of Elk County.

The town occupies both banks of the Clarion River whose course here is generally southerly, and both banks of Elk Creek, which comes down from the northeast and joins the river in the heart of the borough.

These two streams divide the town into three districts comprising Ward One, the old part of Ridgway south of the creek and east of the river, Ward Two, the territory west of the river, and Ward Three, all of the borough land east of the river and north of the creek.

The main industries are principally in Ward Three. Above the dam across the river is the Eagle Valley Tannery and the machine shop and foundry of the Elk Tanning Company. Next in order up stream are the works of the Ridgway Dynamo and Engine Company and the yards of the Ridgway Brick Company. Halfway up Elk Creek, in the borough, is an old dam site and above this are the works of the Russell Car and Snow Plow Company, and immediately above is the plant of the Ridgway Machine Company.

In Ward Two are the dwellings of many men employed at the Ridgway Tannery, which plant is in Ridgway Township, immediately west of the borough and near the banks of the river.

These and smaller industries support the town. In 1900 the population was 3,515 and 1890 it was 1,903. So it appears that the growth has been rapid. Natural gas is abundant in the region about Ridgway and oil is produced in limited quantities. Some coal workings are in operation. Freight rates and transportation, facilities from the lakes and other points are not unfavorable to the further extension of Ridgway's industrial boom. The tanning of leather has been the predominate industry, together with lumbering. While the local supply of bark has long since been practically exhausted, yet the

local tanneries are in a thriving condition and it is possible and probable that they will continue to contribute to the material prosperity of the community. The general officers of the Elk Tanning Company, operating approximately 50 different works in the county, are in Ridgway. The interest centered here, the enterprise and the natural resources all warrant the expectation that the borough will continue to grow provided its naturally healthful conditions be maintained.

These observations would seem to dictate that the consideration of any permanent improvements to public works might well contemplate the time when Ridgway will contain a much larger population.

STREAM POLLUTION.

Sewage and manufactural wastes are discharged into the river or its tributaries, and at Johnsonburg on the river five miles above, and at St. Marys on the creek eight miles above. Elk Creek has its source in the mountains just above St. Marys and courses down through the two boroughs named to the river, the intervening territory being a mountain valley, steep, rocky and nearly uninhabited. At St. Marys artificial drainage into the creek is contributed by a tannery, chemical works, domestic sewage and by an abandoned and an operated bituminous coal mine.

Clarion River heads in the southern part of McKean County. Most of the water shed above Ridgway is in Elk County. The service consists of precipitous hills and narrow valleys, mostly in a geological horizon of the Kittanning coal measures. The district is well watered by copies springs outcropping high on the mountain sides from which timber has been mostly removed. In consequence the rainfall passes off more quickly to the rivers and the low stages of the stream are more frequent and protracted than formerly.

At the present time the channel of the Clarion River at Ridgway is a succession of shallow pools with little water flowing in the bed exposed to view. The bottom is rock full of seams, with occasional gravel deposit and undoubtedly in places there is a subterranean flow. These conditions render pronounced the presence of pollution of the waters by artificial drainage. There is not much difference in appearance of the river above and below Ridgway. At Johnsonburg two paper mills, a sulphite mill and a tannery drain large quantities of liquid waste into the stream and above there are other tanneries and large chemical works doing the same.

The solid and dissolved animal matter, acids and spent tan liquors from the tanneries, the acids and tars and wastes from the manufacture of chemicals by the destructive distillation of wood, the mixed acid and highly offensive mineral and organic waste in dissolved and suspended forms from paper mills, and the sulphates of iron and free sulphuric acid from mine operations, in combinations with solutions of alumina from the shales and clays, produce in the stream a mixture in which compound chemical actions are bound to occur, evolving gases readily detectible and frequently in the summer time a pronounced nuisance along the river. These changes produce precipitates evidenced by the color of the stone in the beds of the streams and by numerous deposits. So the waters in the streams entering Ridgway are not suitable for manufacturing purposes. During the dry weather of the past season the water was dark, almost black. It was worse in the river than in the creek.

SEWAGE DISPOSAL.

Various public sewers and a large number of private drains exist in the borough. About half of the streets are piped with sewers owned by private individuals. Outside privies with earth vaults are also common. There are very few cesspools. With the exception of the lowlands bordering the river and the creek, the town is built on rising ground with marked slopes and not a few of the dwellings are on the hillside. The earth cover is porous and a few feet below the surface, broken, seamy rock is encountered and often a hardpan clay in nature. Part way down the hillsides springs crop out. Some of them are near the flats and others but a little way up the hill and still others are above all dwellings. Earth privy vaults under these conditions could saturate the ground and in wet weather the pollution might be carried along the surface or underground on top of the rock or hardpan to the spring at the lower elevation and thus contaminate the spring and injure the life or health of those drinking the water taken therefrom.

The borough began the construction of a separate sewer system in 1904 and has since made extensions yearly, doing this without knowledge of the law requiring a permit therefor from the State Department of Health, so it is represented. Roof water is admitted to the sewers, the system being about half completed. There are six sewer outlets, four being into the river and two into the creek. The largest is 20 inches in diameter. There is also a large number of private sewers from private properties and the industrial plants which empty into the river and the creek and the small water courses in the borough.

The streams everywhere give evidence of pollution. There are many menaces and nuisances and there is need of a very complete system of sewerage. At the present time there are a large number of private sewers in ward one. They have been built without record in a desultory manner and to serve local purposes. Many of them are of faulty construction and in a bad state of repair. Some of them are partially filled up and altogether they are a menace to public health. There is no way afforded to inspect these old drains, or to repair them, except to actually dig them up. Their courses in some instances follow what were formerly natural water courses diagonally across lots now occupied by business blocks, hotels and dwellings.

One of these old drains is of particular interest. It drains the County Spring and is known as the county spring sewer. It is a stone culvert for part of the way along what was originally a natural water course, beginning at a spring on the hillside at the corner of Spring Garden street and Metoxet avenue (known as the County Spring) and draining the central part of the borough. The culvert is covered over, it is in a bad state of repair and there are no facilities afforded for cleaning out the deposits or maintaining the sewer in a sanitary condition. It is open in places. At its outlet, which is under a blacksmith shop on Main street between Main street and Race street, the sewer is a wooden flume in a dilapidated condition and too filthy to be adequately described. During the warm weather of the season flies abounded. Fifty feet distant is the back porch and kitchen of a large hotel on Main street. Into this old defective drain various private sewer lines and individual properties are connected. The structure is a decided menace to public health. Even where sewers are properly built and provided with modern appurtenances constant care and supervision must be exercised to keep them clean and in a sanitary condition. The county sewer is little more than an elongated cess-pool.

In the southern part of Ward One there is a small water course for convenience termed Hospital Run which rises in the hills back of Cardott street and thence flows down northwesterly under South street and near Center street, passing by the borough water works pumping station and under the Pennsylvania Railroad tracks and thence turning at right angles it passes across a low marshy tract to the Clarion River. The territory east of the railroad is fairly well developed. Center street is one of the important thoroughfares of the town. The run under the railroad is confined to a thirty-six inch cast iron pipe. By the pump house the structure is forty-two inches in diameter built of masonry. Following the course up stream the run passes obliquely across private property to South street and this part of it is confined to a wooden flume or within stone walls planked over. Above South street it is an open ditch. At the time of the Department's inspection in August, 1907, the flow of the stream was principally the discharge of sewage from numerous private house drains. Comparatively few of the dwellings in the district are without some means of disposing of household wastes by water carriage. Along the lower portion of the water course, where it is planked over, there are privies directly over the channel. Other privies have connections discharging directly or indirectly into the water course or the borough sewer which is laid nearby.

The Elk County Hospital is located on the hillside in this district and it has a six inch private sewer which extends down the hill and along First, Euclid and South streets to Pine street where it empties into the borough sewer paralleling the run.

The sewage from the district, whether it be collected in the public sewer or in the water course is finally gathered into a fifteen inch pipe by means of a bulk head built in the railroad culvert at its lower end and thence it is delivered into the twenty inch main intercepting sewer at the manhole in Centre street; but the storm flow in excess of the capacity of the fifteen inch pipe overflows and follows the natural course of the stream to the river.

PUBLIC WATER WORKS.

The municipality owns and operates the water works system.

The works comprise a small dam on Gallagher Run, an intake filter, concrete storage reservoir, gravity supply to town, a pumping station and drilled wells in the borough on the flats and the distributing mains in the streets.

Gallagher Run is a tributary of Elk Creek. It rises in the hills to the southeast of the borough and flows down a steep channel and through the borough, entering the creek near its mouth. The watershed is hilly and uninhabited with the exception of two farm houses, so it is reported. Its area is said to be one and three-tenths square miles in extent. The dam is a small, dilapidated affair, its capacity being less than a day's consumption for the town. The intake filter is a short distance below the dam. It is composed of a concrete wall built across the run, backfilled with stone and gravel to the top thereof. The supply main is inserted in this gravel. The water is supposed to be filtered in this manner and then be conveyed to the concrete storage reservoir. This structure is circular in form, covered, seventy feet in diameter and twelve feet

deep to the flow line. There is an eight inch overflow pipe provided and a delivery main. Both are eight inches in diameter. High water in this basin is elevation 1,604.5 feet above mean sea level. The floor of the pump house in the town is 249.7 feet lower.

At the present time Gallagher Run goes dry. There was no water in the dam in August of the current year. Wells have been driven above the dam on the water shed in a futile attempt to secure flowing water from the ground.

The dam and the pipe in the streets of the borough were built about 1890. The source proving inadequate in 1902, the concrete reservoir was constructed and the pumping station and the drilled wells.

During the past summer all of the public water supply was secured from the drilled wells. They comprise two lines of eight inch pipes sunk in holes drilled to a depth of from fifty-two to ninety-three feet, so it is variously reported. The water bearing stratum is a sand stone. A ten inch casing contains the eight inch pipe and each casing was supposed to have been driven down securely into the rock to prevent surface contamination.

There are two pumping engines directly connected to and driven by gas engines, each capable of raising 375,000 gallons daily. It is estimated that the present consumption is 500,000 gallons per twenty-four hours. Pumping is continued. The ground water is forced into the street main system, any surplus going into the Gallagher Run concrete reservoir.

The quality of the water thus furnished is not satisfactory to the consumers. It is hard, contains iron and is not well adapted to boiler uses. There is a public suspicion that the sanitary quality of the drilled well supply is below standard. The forty-two inch storm drain culvert previously mentioned as receiving considerable sewage passes close by the end of the pump house and on about the same level but slightly lower than the engine room floor. For drainage there is a pipe with a valve on it leading from said floor to said drain. The valve is necessary to prevent the drain from overflowing into the engine room during wet weather. The casing around the well is partly open at the top close to the floor, so that any serious overflow of the sewer might pass down the casing into the well and pollute the town supply. The station is located on Center Street at the Pennsylvania Railroad and distant about 400 feet from the river. Until within a few days before the Department's inspection the hospital sewer and the forty-two inch sewer conveyed the sewage and emptied it into a pool opposite the pump house and distant from the wells possibly about forty feet. From here in wet weather the sewage is washed in a ditch over flat meadow land to the river but during dry weather, such as prevailed this summer, the sewage does not flow but merely soaks into the ground over quite an area grown up with rushes and reeds which retard evaporation. Thus the purity of the borough's water supply is menaced.

There is a forty foot drilled well eighty feet distant from the pump house which is used to furnish water for industrial purposes to the electric light plant. At times water cannot be secured in said well unless the borough pumps be slowed down, so it is reported. If this be true, there is a connection which indicates that the borough pumps might draw sufficient quantities of water from the ground to pull on the surface waters along the ditch and the meadow.

The population now using the public supply is reported to be in the neighborhood of 6,000 people. It is said that a distributing main is laid in every street in the town but this has not been confirmed by the Department for lack of plans of the system. However, there are about 1,000 connections which substantiates the statement that about all of the inhabitants are furnished with the public supply.

PRIVATE SOURCES OF WATER.

Many of the people supplied with public water obtain their drinking water from semi-public springs. The most notable example is the County Spring, supplying the court house and jail and the public fountain in the Square in the central part of the borough. The following tables show the principal springs in wards One, Two and Three:

Springs in Ward One.

Hyde Spring.
Powell Spring.
Hospital Spring.
Johnson Spring.
Allenhurst Avenue Spring.
Sheehan Spring.
Railroad Spring.
Shultz Spring.

Springs in Ward Two and Ridgway Township.

Garrett Spring.
Grant Spring.
Dickinson Spring.
Cherry Street Spring.

Springs in Ward Three.

Depot Spring.
Russell Spring.
Dynamo Company Spring.
Osterhaut Spring.
Tan Hollow Spring.

There are numerous smaller outcroppings in use, some of them being in the cellars of dwellings. There are possibly two dozen dug wells between thirty and forty springs and about fifty individual bored or drilled wells scattered about the borough.

The Hyde Spring is on the hillside away from all habitation and source of pollution. It belongs to the Hyde Estate and the water therefrom is collected in a tank and piped into town and furnished to a limited number of families, thirty-two in all.

The Powell Spring is on the hill above the County Spring and above all dwellings. It is walled up and housed over and the water is piped to the Powell residence in the center of the borough. By permission two other houses are supplied. A few people carry water from this spring to their dwellings. Buckets are filled from the overflow pipe.

The Hospital Spring is on the hillside. It is walled up and covered over and used exclusively by the hospital. However, there are buildings above it on the hill.

The Allenhurst Avenue Spring outcrops in the rock at the foot of the hill on the flat near Elk Creek. Formerly the head race leading from the dam across the creek and furnishing water to run the planing mill in the center of the borough, distant about a block from Main street, occupied the place of the ditch now receiving the flow from this spring. The race was condemned as a nuisance and filled in about ten years ago. The occupants of the houses on the flats in the vicinity of the spring drink the waters. The sources of pollution are from the dwellings on the hillside above. Kitchen garbage is deposited on the banks of the public road directly above the spring. In the extension of Allenhurst avenue there is a well beaten path following the foot of the hillside northerly to near the bank of the creek opposite the Plow Works where there is a copious spring. Individuals carry water in buckets long distances from this place possibly because there is no apparent source of pollution above it on the hills.

The Sheehan Spring is well up the hillside in the southwestern part of Ward One. The water is piped to a small box reservoir from which, so it is reported, the water is led by a pipe to nine dwellings in the vicinity. Topographical evidence would not condemn this source.

Along the Pennsylvania Railroad tracks near the one mile post down stream from the depot there is a spring issuing from the rock. The only observed source of pollution, if this could be considered as such, is possible drainage from the public road high above on the precipitous bluff. The water flows from this spring through a pipe into the railroad gutter, so that people who come there with buckets fill the same without danger of polluting the spring itself.

The Johnson Spring is on the hillside immediately above the dwellings intervening between it and the County Spring. It is enclosed in masonry and the water is piped to a reservoir housed over located on land adjacent to Alvin street. It supplies twelve houses in the vicinity through a pipe system.

The Schultz Spring is close to Metoxet street, one block west of the County Spring. It is in a masonry reservoir housed over. The water is piped to four houses and to a public faucet on Metoxet street. There are a number of houses on the hillside above this. There are two waste drains which empty on to the ground above this spring.

The group of four springs in West Ridgway or Ward Two are not worthy of special mention. People go to them from the neighborhood with buckets to be filled. At least one of these springs in West Ridgway is located below dwellings on the roadside where polluting matter might reach it.

The Depot Spring is on the side of the road at the foot of the hill on whose slope a few dwellings are now located and where others will be erected in the future. The topographical evidence is enough to demand an abandonment of this source of drinking water.

The spring on the flats at the Russell Car and Snow Plow Works has been walled up and covered over in an attempt to protect it from all surface drainage. The flow is quite copious. The neighborhood, locally known as Hydes Hill, resort to this place for drinking water. Recently it has been piped out so that buckets may be filled from the stream issuing from the pipe. The source of this water is probably from the porous strata in the hills on whose sides are the streets and dwellings occupied by the employes of the Snow Plow Works and the Machine Company. In the district earth privy vaults are used and kitchen drainage and slops may be seen in the street gutters. It would not be strange if the ground should at times become saturated and the pollu-

tion finally reach the spring. The topographical conditions are suspicious. There is a risk in drinking the water which prudence dictates should not be assumed.

In the northern part of the borough is the neighborhood spring used extensively by the citizens and the employes of the dynamo works and the brick yard. The dynamo company has acquired the exclusive right to the spring and during the month of April arched it over and securely protected it from surface contamination and provided a pipe overflow from which anyone may obtain water.

Osterhaut Spring is on the hillside above dwellings. It is enclosed and the water is piped to three houses and two offices in the neighborhood of the Depot Spring.

There is nothing about the Tan Hollow Spring requiring special mention. It is similar to the Railroad Spring.

THE COUNTY SPRING.

The County Spring, also known as Earley Spring, is located just above the central residence district of the town, where the slope of the ground becomes quite precipitous. Formerly it was the beginning of a natural water course which went down through what is now the centre and business district of the borough; but this has long since been covered over and substituted by underground conduits as hereinbefore decribed.

The spring has been walled up and housed over and dedicated for county uses. Immediately above it on the steep slopes are fourteen houses, occupied. The water is used at the jail and in the county offices. It supplies the fountain in the public square where people from all over the borough and elsewhere may quench their thirst. The spring house is conveniently located in a well built up neighborhood and its waters are carried in buckets into the homes of hundreds of the citizens.

When wells were drilled to supply water to the houses located on the hillside above the spring, said drilling was coincident with the cloudy appearance of the water in the County Spring. When the drilling ceased the spring water cleared up.

At the time of the Department's inspection sink water and slops from the four houses located immediately above the County Spring were emptied into hoppers connecting to a sewer extending through the lots in the rear of these houses and passing by the County Spring to the public sewer in Metoxet street.

Spring Garden street extends up the hillside to Alvin street and so does a parallel highway known as Stockholm street. In the block between these two highways in the corner near Metoxet street is the spring. The walled enclosure is twenty by thirty feet in plan and six feet deep. The superstructure is kept locked. A pipe leads out to the street and has a free discharge. During August, 1907, there were four dwellings in the block above the spring bounded by Charles street which parallels and lies between Metoxet and Alvin street, which were occupied. Charles street is about 320 feet distant from Metoxet street and elevated fifty feet higher. A four inch tile sewer serving these dwellings passed within seventy feet of the County Spring and about fifteen vertical feet higher. The nearest house discharged roof and closet drainage to the sewer and immediately below the connection, prior to the Department's inspection but within a few days, the sewer had been uncovered and found to be in a faulty condition. The joints were loose and uncemented and the sewage had leached out into the surrounding ground. It was concluded that probably the whole line of the sewer was in a similar condition. This in itself was a menace to the purity of the County Spring waters and would account for the result of the bacteriological examination of samples of the County Spring water hereinafter given.

On the upper side of Charles street there are three occupied dwellings in the block having inside closet connections to the sewer. On the upper side of Alvin street which is five hundred feet from Metoxet street and two hundred feet higher there is a dwelling from which roof and closet drainage goes to the said four inch sewer. The other dwellings are west of Spring Garden street and are not connected with the sewer line.

During August, under the advice of the State Department of Health, the borough continued the work which it had initiated of laying six inch and eight inch public sewers in Stockholm, Alvin, Charles, Spring Garden and Metoxet streets in order that the private sewer line of Mr. Johnson might be abandoned and the purity of the spring water be protected as far as the abandonment of the four inch sewer line could protect the spring from pollution.

INDUSTRIAL WATER SUPPLY.

The Ridgway Tannery uses water from a seventy foot drilled well on the property for manufacturing and drinking purposes. The Eagle Valley Tannery also has a system of driven wells on the banks of the river in use for manufacturing and drinking purposes.

The shallow wells at the Dynamo Company's plant furnish the water required there for manufacturing. Some of it may be drunk by employes. There is an emergency connection between the Eagle Valley and the Ridgway Dynamo and Engine Company pipes and the borough system of water works by means of which either one or both of these companies can pump the shallow well water into the town main. The water is hard and not satisfactory for boiler uses. It ought not to be used for drinking purposes without purification.

Both the Plow Works and the Ridgway Machine Company use drilled well water for manufacturing. The borough furnishes some water to the latter plant.

TYPHOID FEVER PRIOR TO 1907.

Typhoid fever has been prevalent in Ridgway for a number of years. Cases in sufficient numbers to amount to a small epidemic have broken out each spring among workmen in certain shops, or in neighborhoods using certain spring water or in dwellings supplied by public water year after year, and various investigations and conclusions condemnatory of existing borough water works and of some of the private springs have been made public. This crystalized into public sentiment as expressed by an overwhelming majority at the special municipal election held on the 22d day of July, 1907, in favor of a bond issue to defray the cost of a new source of a public water supply for the town.

As far back as the winter of 1895-6 there was a typhoid epidemic amounting to about fifty cases among the mechanics and laborers employed at the McEwen Manufacturing Company works, now the dynamo plant and among those living in the vicinity all of whom drank water from the Dynamo Spring. Investigations resulted in the condemnation of the spring and it was walled up and surface water was diverted away from it.

At that time Gallagher Run reservoir supply was supplemented in dry weather from the shallow driven wells on the banks of the river at the dynamo works. The epidemic continuing in 1897, the investigation seemed to indicate that the outbreak, ninety-seven cases in all, was among people chiefly in the district supplied by the public water. Samples of water collected from the Dynamo Works Spring and from the Gallagher reservoir and from a tap in a dwelling in town where were two typhoid cases, showed the presence of sewage organisms. It was reported that all of these cases occurred in houses supplied with public water and so the State Board of Health condemned the shallow well supply and the Dynamo Spring. The recommendation was also made that a new water supply should be secured from an uninhabited water shed.

In the spring of 1904 there was a typhoid epidemic and April 9th fifty-four cases had been reported. Samples of water collected on that date from Gallagher Run reservoir and from the town pump house wells showed the former to be uncontaminated but sewage organisms were present in large numbers in the latter water. The pumps had been operated from ten to twenty days prior to the outbreak of fever and again during. It was concluded that a majority of typhoid cases occured in dwellings supplied with the borough water. So the pumping system was condemned.

There were at least thirty cases of typhoid fever during 1906. Tests in 1904 of the County Spring water supplying the drinking fountain in the public square and the county buildings showed sewage contamination. Both the public supply and the county spring had been officially condemned by State authorities prior to 1907.

TYPHOID EPIDEMIC IN 1907.

Fifteen cases of typhoid fever were reported in the early part of the current year. Ten of them occurred among the employes at the Dynamo Works who drank from the Dynamo Spring. Thereupon the company made the improvements at the spring hereinbefore described.

On August 16th, 1907, when Dr. Moulton arrived in Ridgway he found seventy cases of typhoid fever in existence. The outbreak occurred, as near as could be ascertained, about August 1st. There were 258 cases recorded at the end of the month, also fifty-three for September and nine for October, making a total of 320 cases. Out of 270 cases of which a census was taken 130 drank from the County Spring constantly and sixty-three were known to have drank this water occasionally. Perhaps the others did also.

Furthermore of the 270 cases there were 156 where each case represented a separate family. The small number of secondary cases may be attributed to the manner in which the epidemic was handled by the townspeople in carrying out the injunctions of the Commissioner of Health. The district nurse service and the isolation of cases in the hospitals and the entire management is set forth in Dr. Moulton's report to which reference may be had.

A case of typhoid fever occurred in June in one of the dwellings in the County Spring block hereinbefore mentioned. The house is located on the northeast corner of Spring Garden and Charles streets. It is 200 feet distant from the spring. There was a sewer connection by hopper for kitchen waste and wash water to the four inch Johnson sewer. There was an earth privy vault close to the sewer. Dr. Moulton investigated the case and reported in part as follows:

> "This patient was in Pittsburg during the month of May and returned on the last day of the month. He worked until the sixth of June, although he felt unwell and on the sixth he called upon a local physician who sent him home. At this time he had a diarrhoea and was in the habit of visiting the closet in the rear of the house, up to June 10th, at which time another physician was called and the diagnosis of typhoid fever was made. The positive diagnosis was made on the twelfth. This patient was ill in bed for six weeks. An examination of a specimen of blood taken from this patient gave a positive Widal re-action.
>
> When this closet was cleaned out by order of the Department of Health, a small spring was found to be present in the vault, although there was no evidence of overflow."

Infection from the privy vault which was full to overflowing at one time prior to its cleaning out and disinfection and abandonment by order of the Department, might have washed over the surface of the ground to the County Spring or it might have found an underground passage. Still further, the sewer could have transmitted the infection and deposited it in the ground in proximity to and above the spring from whence the drinking waters could have been ultimately polluted. All topograhical evidence, the bacteriological test and other facts in the possession of the Department call for the absolute condemnation and permanent abandonment of this spring as a source of drinking water. It was temporarily shut off and disinfected.

WATER SAMPLING.

During the latter half of August and extending during the months of September and October samples of water were collected from public and private sources and analyzed bacteriologically. The County Spring, the wells at the town pump house, the spring at the Snow Plow Works and the Schultz, Allenhurse and Dynamo Springs were found to be polluted. So also were two other private springs, one dug and three driven wells in the town. Owing to the methods of household waste disposal in vogue, it is surprising that the test did not show pollutions of ground waters in a large number of cases.

The following table shows the test of the waters found polluted:

COUNTY SPRING.

Sample collected	August	20th,	12 bacteria,	0	Colon.
		21st,	280 bacteria,	0	"
	Sept.	3d,	5,000 bacteria,	66	"
	Sept.	12th,	6,000 bacteria,	0	"

TOWN PUMP HOUSE WELL.

August	20th,	7 bacteria,	0	Colon.
	21st,	12 bacteria,	0	"
Sept.	3d,	180 bacteria,	4	"
	12th,	3 bacteria,	0	"
	17th,	96 bacteria,	1	"
Oct.	4th,	97 bacteria,	0	"

SNOW PLOW WORKS.

Sept.	3d,	3,000 bacteria,	32	Colon.
Oct.	4th,	200 bacteria,	0	"

SHULTZ SPRING.

Sept.	3d,	4,200 bacteria,	0	Colon.
	10th,	500 bacteria,	0	"

ALLENHURST SPRING.

Sept.	13th,	3,000 bacteria,	35	Colon.

DYNAMO SPRING.

Sept.	3d,	22 bacteria,	0	Colon.
Oct.	4th,	100 bacteria,	2	"

PRIVATE SOURCES ABOUT TOWN.

Date.	Locality.	Source.	Bacteria.	Colon.
Sept. 3rd,	142 Sherman St.,	Spring,	400	12
Sept. 13th,	142 Sherman St.,	Spring,	28,000	180
Sept. 12th,	610 Race St.,	Spring,	11,000	250
Sept. 12th,	E. Main St.,	Dug well,	4,200	40
Sept. 14th,	313 Cherry St.,	Driven well,	28	1
Sept. 17th,	206 Chestnut St.,	Driven well,	2,200	1
Sept. 17th,	336 Montmorenci St.,	Drilled well,	800	2

REMEDIES EFFECTED.

On August 27th, 1907, the borough authorities made application to extend the public water works and to obtain an additional source of supply from Mill Creek. The petitioner stated that some thought had been bestowed on a supply from Island Run, but that council did not approve of it. Nevertheless in event that the State should deem this supply preferable to Big Mill Creek, then the borough desired the State to approve of the Island Run supply. The discussion of the subject is fully set forth in the permit issued by the Commissioner of Health on September 5th, 1907, approving the Mill Creek supply.

The local authorities were ordered to immediately disconnect the town's distributing system with the existing wells at the pumping station and at the Eagle Valley Works and at the Dynamo Company's Works and thereafter upon the introduction of the new supply into town, this and the Gallagher Run supply shall be the only sources used in the public system and the latter shall be discontinued as soon as practicable.

The borough authorities were notified that particular attention must be paid to the design of the filter plant for the purification of Mill Creek supply. Detail plans thereof are to be submitted to the Department for approval.

The county commissioners and the borough authorities were notified to cooperate relative to the early substitution of the new public supply at the court house, jail and public fountain in place of the County Spring condemned. And the local authorities were urged to bring about at the earliest practicable moment the discontinuance of the use of ground waters in the borough and of any drinking water in the manufactories except that supplied by the borough from the new source or some equally good water.

The Commissioner of Health advised that house connections with sewers wherever the dwellings are in proximity to wells or springs should be compulsory.

But various springs were condemned as will appear by the following communications sent out by the Commissioner of Health on September 3rd, 1907:

"William M. Thomas,
"Chairman County Commissioners,
Ridgway, Elk Co., Pa.:

"Dear Sir: I beg to respectfully inform you that I am also by this mail notifying the borough authorities that the so-called County Spring in Ridgway has been condemned by me as dangerous as a source of drinking water and prejudicial to the public health, and you are requested, in co-operation with the borough, to abandon this spring altogether and to supply the county buildings and the public drinking fountain with the new filtered public water as soon as the same may be available. Meantime, the public fountain should be closed and the county spring water be boiled whenever used for domestic purposes. In fact, all water during this period used for domestic purposes should be boiled.

"Yours very truly,
"SAMUEL G. DIXON."

"To the Board of Management,
"Ridgway Hospital,
"Ridgway, Elk Co., Pa.:

"Gentlemen:—I beg to inform you that I have condemned as a dangerous source of drinking water the spring now supplying the hospital and nurses' home. The location is bad and pollution is possible and there is a risk attending its use for drinking which prudence dictates should not be assumed. You are, therefore requested to discontinue this spring, substituting for it the new filtered public water as soon as the same may be available. Meantime, all water from whatever source used for domestic purposes should be boiled, I am,

"Very truly yours,
"SAMUEL G. DIXON."

"Ridgway Dynamo and Engine Company,
"Ridgway, Elk Co., Pa.:

"Gentlemen: I hereby request you to sever all connection between your driven well system and the borough water works system as soon as the borough shall have installed and put in operation its new source of public supply. After that time it will not be necessary in emergencies, or at any other time, for the town to obtain water from private sources.

"The so-called Dynamo Spring is badly located and the history attending the use of this water for drinking is coupled with prevalence of typhoid fever among your employes and the neighborhood. Tests have shown the water to contain sewage organisms. I, therefore, advise you and request that this spring be abandoned for drinking purposes and that you substitute therefor in your works the new filtered public water supply as soon as the same may be available. Meantime, you are requested to furnish boiled water only to your employes. Your attention is called to the discussion of the subject of the borough's public and private water supplies in a permit issued by the State to the borough for improved water works. Soliciting your support in the general health work which the Department is undertaking to do all over the State, I am,

"Very truly yours,
"SAMUEL G. DIXON."

"Ridgway Brick Company,
"Ridgway, Elk Co., Pa.:

"Gentlemen: I have condemned the so-called Dynamo Works Spring. The employes of your company drink this water. There is a risk attending this which prudence demands should not be assumed. Tests of the water have shown sewage organisms in it. You are requested to supply your men with the new filtered public water as soon as the same may be available, and meantime, to furnish only water which has been boiled.

"Yours truly,
"SAMUEL G. DIXON."

"Elk Tanning Company,
"Ridgway, Elk Co., Pa.:

"Gentlemen: You are hereby requested to discontinue all connections between the pumping plants and private water works systems at your works in the borough and vicinity with the pipe system of the borough water works, so that it will be impossible at anytime for you to supply water to the borough pipes and street mains. This should be done as soon as the new borough supply is installed and put in operation. There will then be no need for emergency connections with any private sources.

"You are also requested, meantime, to supply to your employes for drinking only such water as has been boiled.

"Your attention is called to a general discussion of the entire water works question in the permit issued to the borough for water works improvements and your hearty co-operation is solicited in order that Ridgway may be restored to a full enjoyment of its natural healthful conditions, so far as water supply is concerned."

"Yours truly,
"SAMUEL G. DIXON."

"Ridgway Machine Company,
"Ridgway, Elk Co., Pa.:

"Gentlemen: This is to inform you that the State Department of Health is, at the request of the present borough officials, at work in the endeavor to restore Ridgway to the enjoyment of its natural, healthful conditions. The ground waters in the borough are, with few exceptions, unsuitable for drinking purposes as the present and past history amply proves. You are advised, therefore, to discontinue the supplying of any ground water at your works to be used for drinking, unless the water be boiled. As soon as the new filtered public supply is available, this should prove the safest source.

"Yours truly,
"SAMUEL G. DIXON."

"Russell Car and Snow Plow Company,
"Ridgway, Elk Co., Pa.:

"Gentlemen: The spring on your property is in the bottom of a basin upon whose slopes there are numerous earth privy vaults and kitchen drainage and slops may be seen in the street gutters. It would not be strange if pollution should reach your spring. The topographical conditions are suspicious. There is a risk in drinking the water which prudence dictates should not be assumed. You are advised, therefore, to abandon this spring as a source of drinking water and to substitute therefor the new filtered public supply as soon as the same may be available. Meantime, all drinking water should be boiled.

"Yours truly,
"SAMUEL G. DIXON."

"James Penfield,
"Secretary Board of Health,
"Ridgway, Elk Co., Pa.:

"Dear Sir: I wish through you to call the attention of the local board of health to various matters mentioned in the text of the written permit issued by me under the law to the borough council relative to improved water works, and to invite your careful consideration to the suggestions and recommendations and requirements therein. This permit will be in the hands of the Secretary of the borough.

"Yours truly,
"SAMUEL G. DIXON."

The borough council was also notified that complete plans of existing sewers must be prepared and filed together with a satisfactory report, in the office of the State Department of Health in compliance with law. The town officials forthwith started the preparation of the plans, surveys are now underway for a comprehensive sewerage system and the report with an application for permission to extend the sewer system will be submitted to the Commissioner of Health for approval at an early date.

CONCLUSION.

The experience at Ridgway emphasizes the well established relation between filth and disease. In man's artificial town, natural agencies are not able unaided to successfully cope with the wastes of human existance. No amount of individual hygiene can garrison against an invasion of epidemic. Public measures are necessary to protect and promote the health of the community.

Not only was the river and the creek badly polluted, rendering the waters unsuitable as sources of supply for drinking purposes even when drawn from wells on the banks of the stream, but the small water courses in the town were open sewers, and it may be truthfully said that only by prompt and vigilant action was the borough saved from an epidemic of great magnitude. As it was, it has been estimated by conservative minds that the outbreak cost the community one hundred thousand dollars. The wonder is that the outbreaks of the past had not been more extended. The warnings had been finally heeded and the authorization by the voters of an increase in the municipal investments to pay for a new water supply proved timely. At the close of the year the work accomplished in erecting the dam and the pumping station on Mill Creek and the laying of the force main to the town was reported to be highly satisfactory to the citizens. The manufacturers and the citizens seem to have grasped the situation. The advice of the State Department of Health was gladly received and followed. It is believed, however, that ground waters are still in use, and that this practice will continue on private estates in some instances unless the sources be condemned and put out of use by the local board of health or unless sickness shall occur in the families using the waters. A general warning against the practice of drinking water drawn from the ground in proximity to habitations, cesspools, privies and sewers has been given.

The epidemic was undoubtedly due to the pollution of the county spring caused by the poisons from one person afflicted by typhoid fever, having reached the spring possibly through a faulty sewer and an underground channel. From the experience, Ridgway bids fair to emerge ultimately, a model town with respect to sanitary improvement. Undoubtedly it is a safer place to-day, in which to reside, than ever before.

TYPHOID AT BURNHAM.

About the middle of November, 1907, on request by the superintendent of the Standard Steel Works of Burnham, Mifflin county, Pennsylvania, that an investigation should be made at said works by the State Department of Health of the prevalence of typhoid fever there, the Commissioner of Health directed that the Engineering Division should make an examination of the property and of the water works furnishing the water to the industrial plant. Mr. Harvey Linton, C. E., was given written instructions which he followed out in making a thorough inquiry into the typhoid outbreak. The subject involved the supply of water to other communities in the neighborhood. The following report is compiled from various sources of information.

GENERAL CONDITIONS.

Mifflin county is in the central part of Pennsylvania. It is drained by the Juniata River and on this beautiful stream about midway of the county is the borough of Lewistown, county seat. The town's site is on the north bank at the mouth of Kishacoquillas Creek.

A number of boroughs and villages are nestled in the valley of this creek. These towns and boroughs are joined by railroad and trolley and by suburban districts to form practically one continuous settlement from Lewistown northward to Reedsville, a distance of about five miles. A population of about 16,000 is contained in the district, the distribution of the population being approximately shown in the following table:

Lewistown borough,	9,000
Burnham village, Derry township,	2,500
Yeagertown village, Derry township,	1,200
Reedsville village, Brown township,	1,200
Milroy village, Armagh township,	1,200
Naginey village, Armagh township,	200
Siglerville village, Armagh township,	200
Lewistown Junction, Granville township,	500

The Lewistown Water Company has been supplying the borough of Lewistown for many years, obtaining its supply from Minehart Run, a small mountain steam which joins the Juniata River from the southwest about five miles above Lewistown.

The Reedsville Water Company and its subsidiary concerns furnish water in the townships of Armah, Brown and Derry. The sources are three tributaries of Kishacoquillas Creek; namely, Coopers Gap Run, Laurel Run and Treaster Valley Run, all of which streams rise in the hills northeast of Reedsville and Milroy.

These two water works systems meet within the limits of the borough of Lewistown and are connected by means of two six inch pipes, so that one system can be used to re-inforce the other in time of shortage from either source of supply. As a matter of fact, the Minehart Run supply, by reason of the inadequate size of the main, is continually re-inforced by the Reedville system.

Lewistown is a very old town. It was organized over 100 years ago. Within the last eight years it has witnessed a remarkable growth. The population in 1890 was 3,273, in 1900 4,451 and in 1908, 9,000 estimated.

The principal industries in Lewistown are the Lewistown Knitting Mill, employing 100 hands and the Lewistown and Reedsville Electric Railway employing fifty hands.

About two miles up the valley of the Kishacoquillas is the village of Burnham. It is located on the eastern bank of the stream and it is here that the Standard Steel Works and the Logan Iron and Steel Company Works are to be found. The former employ between 3,000 and 4,500 men and the latter between 300 and 400 men. These two companies and the village are supplied with water by the Reedsville Water Company.

A mile above Burnham village is Yeagertown. The James H. Mann Axe Factory, employing 150 hands when in full operation is located here. Next comes Reedsville where the main stream forks the Milroy branch extending at right angles northerly and the other branch which retains the main stream name extending southerly. Both drain watersheds long but not broad bounded by mountain ridges forming fertile valleys underlaid by limestone and supporting an agricultural population which from all appearances is a prosperous one. The land is under a high state of cultivation. Milroy village is on the Milroy branch watershed five miles above Reedsville. Thompsons Knitting Mills are located here and give employment to 125 hands.

Naginey village is about two miles down stream below Milroy where the Milroy branch forks, the main branch being called Honey Creek and extending northeasterly, and the other tributary being called Laurel Run and extending northwesterly. It is on Laurel Run that Milroy village is located. On a tributary of Honey Creek, caled Treasters Run, is the village of Siglerville.

In the vicinity of Naginey there are large limestone quarries. The Cambria Steel Company employs about 150 men in its quarries and the Penn Lime and Stone Company employs about fifty men in its limestone quarry. All of the above named places are supplied with water by the Reedsville Water Company, with the exception of Siglerville.

REEDSVILLE WATER COMPANY SYSTEM.

Three streams furnish the supply for the Reedsville Water Company, namely, Coopers Gap Run, Laurel Run and Treasters Run. They are all gravity sources.

The intake on Coopers Gap Run is about three and five-tenths miles due north of Reedsville in Brown township. It consists of a low masonry dam affording no storage. A ten inch supply main leads from this intake to Reeds-

ville and thence through Yeagertown to Burnham and Lewistown. The stream above the intake drains an uninhabited mountainous area, comprising five square miles, all thickly wooded. A short distance below the intake the run disappears into a limestone sink. It is supposed to reappear at some point below and eventually join Kishacoquillas Creek.

The two other sources mentioned are in Armagh township. The Laurel Run intake is situated on Laurel Run about two miles above Milroy. This stream is in many ways similar to Coopers Gap Run, but is paralleled above the intake by the Lewistown-Bellefonte turnpike which is much in use as a thoroughfare. The watershed is reported to be twenty miles in extent, all mountainous and wooded. The greater part is within the boundaries of the State Forestry Reservation. There is one occupied house on the watershed. It is high up the mountain side about four miles above the dam and it is occupied by a man and his son and occasionally by hunters in the reservation. A twelve inch supply main leads from the intake, which is similar to that on Coopers Gap Run, to Milroy, and thence the diameter is reducted to ten inches to Reedsville where it connects with a line from Coopers Gap Run. As in the case of the latter stream, Laurel Run disappears into the limestone about two miles below the intake. At Reedsville there is the equalizing and distributing reservoir of one and a quarter million gallons capacity.

The intake on Treasters Run is similar to the other intake, is located about two miles above Siglerville, and was erected in 1906, because the two sources of supply previously described proved inadequate. The system is used principally to furnish the Standard Steel Works and the town of Burnham a supply of water separate from that of the Laurel Run and Coopers Gap supply. On the Treasters Run system there is a distributing reservoir located on the hill opposite Yeagertown. It is ten miles distant from the intake, the supply main being sixteen inches in diameter and having a capacity of sufficient amount to meet all demands for the present. But in the future, if all of the available water yielded by the water shed above the intake should be demanded, an additional main supply pipe will be demanded. The difference in vertical head between the intake and the reservoir known as Burnham reservoir is fifty feet only and this limits the carrying capacity of the pipe to less than 2,000,000 gallons per twenty-four hours. So it is seen that a very abundant flow of the watershed would largely pass over the spillway of the intake which is twenty feet wide and be wasted.

There are two connections between the supply main from Laurel Run and Coopers Gap Run and the Traster Valley main. One of the connections is made in the gap below Reedsville and the other near Burnham reservoir. Thus the two old systems of supply can be drawn upon or the new supply can be tapped to furnish the older supply main.

The Burnham reservoir is of quite recent construction. It holds two and a quarter million gallons when full. It is rectangular in shape, the inner sides are sloped and they and the bottom are paved with brick. Facilities for drainage are afforded. Treaster Run valley water is delivered into this reservoir at the top. It is taken out at the bottom through a twelve inch pipe which leads to Burnham. The town can be supplied by Treaster Run water directly when the reservoir is put out of commission for any purpose.

The watershed on Treasters Run above the intake is quoted to be fifteen square miles in area. Most of it is within the State Forest Reservation and is uninhabited. There are three occupied estates and one uninhabited one on the area. They are along the highway which follows up, the valley and terminates a mile and a half above the intake at the residence of Benjamin Moore. This dwelling is on State property, Mr. Moore being a warden.

In the immediate vicinity of the intake is the house of Adam Ramsey and a dwelling occupied by the Water Company. A half a mile above is the residence of James Ramsey and a mile above is the uninhabited house of L. F. Treaster.

TYPHOID OUTBREAK.

About the first part of November rumors of a typhoid epidemic at Lewistown and Burnham reached the State Department of Health and almost immediately thereafter the superintendent of the Standard Steel Works called for assistance. The local health authorities co-operating with the State officers, endeavored to locate every case of typhoid fever in the town and the county roundabout and on the watershed. The Department's representatives examined the watersheds but there were no cases of typhoid fever thereon. The following table shows the distribution of the typhoid cases by months and places. Highland Park is really a part of Yeagertown. It will be noted that the first case occurred in July, being in Burnham, followed by three cases the next month in the same place and by ten cases in September, eight of which were in Lewistown, and by twenty-three cases in October, the latter being scattered in seven different places, making a total of thirty-seven cases in all. The outbreak had ceased on November 14th when the Department made its first inspection.

	July.	August.	September.	October.	Total cases.
Burnham,	1	3	2	3	9
Yeagertown,	.....	.....	.....	3	3
Highland Park,	.....	.....	.....	1	1
Reedsville,	.....	.....	.....	2	2
Milroy,	.....	.....	.....	2	2
Lewistown,	.....	.....	8	10	18
Granville twp.,	.....	.....	.....	2	2
	1	3	10	23	37

A remarkable fact is that the cases occurred wholly among men employed in the Standard Steel Works.

The Steel Works occupy a strip of land about 4,500 feet long abutting Kishacoquilas Creek and extending back therefrom from 600 to 1,500 feet comprising all told eighty-eight acres. The Steel Foundry is on the banks of the creek at the down stream end and above it on the banks is the machine shop and back from these is the axle plant and the tire mill. Above these shops are the upper mills comprising open hearth plant No. 2, iron foundry No. 2 and 3 and the wheel rolling mills. The place of employment at the Standard Steel Works of the men comprising the thirty-seven cases of typhoid fever above mentioned is shown in the following table and from this is will be observed that one man only was employed in the upper shops.

Steel Foundry,	14 cases.
Axle Plant,	6 cases.
Tire Mill,	7 cases.
Yard,	6 cases.
Machine Shop,	2 cases.
Carpenter Shop,	1 case.
Open Hearth Plant No. 2,	1 case.

Water for drinking purposes is obtained from two sources at the Standard Steel Works, one being the Burnham reservoir and the other is a drilled well located on the property in proximity to the Steel Foundry, Axle Plant and Tire Mill.

The Burnham reservoir is situated about half a mile north of the works. The gravity supply main from the reservoir is a twelve inch increasing to sixteen inches. Treasters Run water was supplied to these pipes during the entire time under discussion.

Kishacoquilas Creek water is pumped into a tower back of the axle plant and is used for cooling purposes and for making steam. Said creek water is hard so that Burnham reservoir is used to furnish water for the boilers alternately. This retards the accumulation of scale in the tubes.

The drinking water piping system extends through the different shops. The pressure in the pipes from Burnham reservoir is eighty-five pounds. When creek water is being pumped the pressure is twenty pounds so it is not possible for creek water to be forced into the water supply main unless valves are closed and the Burnham reservoir pressure taken off.

Employes are instructed to draw water from the drinking water spigots. The latter are plainly marked.

The drilled well is located outside of and near to the lower end of the axle shop. It is said to be ninety-five feet deep. Compressed air is used to force the water from the well up a three-quarter inch pipe. The water comes from limestone. The plant was installed to furnish drinking water. The outlet is free, the flow is constant, when the works are operated, and the men have to come to the well to obtain the water. The outlet pipe is curved in a half circle to discharge downward. The water is carried off by a drain. Cups are provided and the employes prefer this water because of its coolness.

On October 10th the superintendent closed down the airlift and put the well out of commission because of a suspicion. The last case of typhoid fever reported was ten days later.

DISCUSSION.

If the Reedsville Water Company's supply was the medium of tranmission of the typhoid infection, sickness would have occurred throughout the village of Burnham among women and children as well as men, and this observation

is true respecting the Lewistown Water Company's supply. Furthermore, no source of pollution of these supplies was found and hence they may be eliminated from further discussion and suspicion.

The Department's representative, without any attempt to do so, but accidentally, observed an employe drinking raw creek water from the end of a rubber hose at the Tire Mill. It is known to the Department that the practice is by no means rare for mill hands to drink the water supplied to the mills for cooling purposes. And this they will do in spite of warnings and the placing of printed notices throughout a shop. Convenience and intense thirst and lack of belief in sanitary principals prompt men to disobey the injunctions of health officials. The sewage pollution of the creek above the pump intake is of an individual and private sewer class. The fact that 3,000 hands were employed and about one in every hundred was affected indicates that the poison was not extensive. The distribution of the cases through four months signifies that the infection was more than a passing one. It seems to have increased up to a given point and then to have suddenly stopped. No cases have been reported to the Department since then. It may have been a co-incident that the cessation of the epidemic if the outbreak could be rightfully termed an epidemic, and the cessation of the operation of the airlift well supply covered a period of time equal to the incubation period of typhoid fever.

There is a sewer system at the Standard Steel Works which conducts the sewage to and discharges it into the main creek. There are sewers on the hillside in East Burnham which perform the same service. Wells formerly used for drinking water in these places have been turned into cesspools since the introduction of a public water supply. It is mere conjecture to attribute the typhoid outbreak to sewage deposited in these wells or into the ground in the neighborhood of the Standard Steel Works. No very large quantity of water was drawn up out of the airlift. Nevertheless, it is known that underground channels in limestone do in some instances, convey sewage long distances and it is therefore prudent to look with suspicion on limestone supply when drawn from the ground in the neighborhood of hundreds of individual properties upon which sewage is disposed of in a manner to make possible the contamination of the underground sources.

The Department had the well at the Steel Works put into commission on the 18th of November. The air lift was operated for several hours and samples were taken and sent to the health laboratories at Philadelphia for examination. No colon were present in a cubic centimeter of water. The ordinary water bacteria averaged 280. The least count was eighty-five and the greatest 600. However, the conclusions were that the interests of the public health would be subserved by the continued discontinuance of the well and it is understood that the corporation has permanently abandoned the supply.

CONCLUSIONS.

From economical considerations alone a great industrial corporation must safeguard the health of its employes by providing a pure water supply for drinking purposes and by affording ample and sanitary drainage facilities at the works and by the support of public measures for the protection and promotion of the health of the individual.

The outbreak of typhoid fever among the help having ready access to the well water at the lower mills of the Standard Steel Works finally attracted attention of the company's management to this well as a possible origin of the transmission of infection. So the supply was cut off. The State's subsequent investigation failed to discover the origin of the disease, although it confirmed the judgment of the company in closing and permanently abandoning the well.

The lesson taught by this experience emphasizes the warning oft repeated of using water for drinking purposes drawn from the ground in limestone regions in populous districts. There is always more or less of a risk in such a practice, more especially where the topographical evidence points to the possibility of underground transmission of pathogenic poison.

ANTHRAX OUTBREAK NEAR CORRY, PA.

Investigations by the Engineering Division of Broken Straw Creek Valley in Warren county relative to the pollution of streams therein by tannery refuse, were undertaken during the latter half of the year. An anthrax epidemic is the valley was the primary cause of the examination. On August 9th, 1907, D. F. A. Wheelock, C. E. of Warren, being in the vicinity, was directed to make a hurried investigation of the Howard Brother's tannery in the vicinity of Corry, Erie county, Pennsylvania. The advises at that time were that an alleged outbreak of anthrax among cattle on the farm of H. S. Ayers was attributable to the tannery waste pollution of the waters of Hare Creek along whose banks the herd was pastured. The inspection was made, samples of stream water and of tannery refuse were analyzed, the baccilli anthracis were found

in the tannery liquid, warning placards were posted along the stream in the valley and other precautionary measures were taken by order of the Commissioner of Health, all of which appears fully set forth in the following report:

GENERAL LOCATION.

The J. W. and A. P. Howard Brothers tannery is located in the extreme western part of Columbus township, Warren county, on land adpacent to the eastern part of Columbus township, Warren county, on land adjacent to the easttween Erie and Warren counties.

The main line of the Philadelphia and Erie Railroad and also the main public highway leading from Corry city easterly pass by or through the tannery property and down Broken Straw Creek Valley. For most of the distance to where the stream discharges into the Allegheny River at Irvington Station, some twenty miles from Corry, it may be observed from the passenger coach window.

Hare Creek rises in Chautauqua county, New York State about six miles above Corry, passes through the city and thence by and a short distance north of the tannery, and immediately below the tannery through the farm of H. S. Ayers, finally emptying into Broken Straw Creek about two and one-half miles southeast of the tannery property.

Broken Straw Creek also rises in New York State and takes a generally southeasterly course coming down through Columbus borough three miles east of Corry city, in Warren county and thence passing through Spring Creek village in Spring Creek township, and Garland and Pittsfield in Pittsfield township and through Youngsville borough and Irvine, all in Warren county, to the Allegheny River which it enters at a point about four and one-half miles below the borough of Warren. The stream traverses a total distance of about thirty miles and drains a watershed of over 300 square miles of wooded hills and cultivated valley with nothing markedly characteristic with respect to run-off.

CONDITION OF STREAMS.

Hare Creek in the vicinity of Corry and the tannery has an average width of about thirty feet. The banks are in the neighborhood of six feet in height. The adjacent lands on either side is low, flat and swampy and subject to inundation during floods. The channels is extremely crooked and the flow sluggish and the volume small during summer. The large amount of sediment on the bottom and sides is noticeable, even to a casual passer-by.

A small branch heads a few hundred feet south of the tannery and flows northerly through the said property emptying into Hare Creek about 500 feet farther north. This run which naturally contains but little kater, except during heavy rains, receives the drainage from the tannery and its channel operates as a settling basin for the solid wastes discharged into it. The color of the water is dark red and the odors from this run and from the creek to where it discharges into Broken Straw Creek are strong and noticeable and a nuisance to the travellers on the public highway and to the people living in the vicinity.

Above the tannery run in Hare Creek, fish are observed to live and here the water is comparatively clear, except so far as it is polluted by Corry city sewage. The main city outlet is into the creek at a point about 600 feet above the tannery run. Below said run, in the creek, large numbers of dead fish are found. This fact is charged by residents to the sewage and tannery pollution, particularly to the latter. There is no marked contamination of the creek above the city, for there are no villages there, the territory being agricultural with usual conditions found about farm buildings.

The general condition of Broken Straw Creek from the mouth of Hare Creek to Youngsville borough, a distance of about eighteen miles, is bad, the water in the stream being dark colored and the evidences of tannery pollution are plainly seen along the banks and in the bed, the sides of the channel being covered with a black deposit which increases in amount from Youngsville upstream fourteen miles to Spring Creek village where there is a tannery. Here the water in Broken Straw Creek is very black, so that the bed of the stream is entirely obscured. Above the Spring Creek tannery the distance is about six miles to the said Howard Brothers tannery and in this stretch of the water course the evidences of pollution become intensified as one approaches the latter tannery.

HOWARD TANNERY.

The Howard Tanning Company is an independent concern engaged in the manufacture of sole leather. The capacity of the plant is about 350 hides per day, although the past six months it has not exceeded 275, according to reports. The greater bulk of the hides come from Chicago, Kansas City and Dallas, Texas. Some are obtained from Cleveland, Buffalo and Pittsburg; one or two bales from China have been received, the latest one in 1906. It is reported that South American hides have not been used at the works during the past eight years.

The raw stock is first placed in the store house. It is drawn upon as wanted and put in soaks and kept there for two or three days for the purpose of cleaning. These soaks are called wash tanks. Next the stock is placed in limed vats and kept there until the hair is loosened so that it may be readily removed. After the hides are cleaned of hair they are placed in vats containing, so it is said, one part of sulphuric acid to 1,000 parts of water, to receive what is termed the plumping process by means of which the pores of the hides are opened so that they will take the tanning liquids. After this the hides are placed in vats containing solutions of tanning liquor of increasing strength. Each hide is moved forward from tank to tank until the tanning process is completed. Washing in pure water is then accomplished and afterwards, if a hide is not light enough in color, it is bleached in water and sal soda and then given an application of coal oil to secure a gloss or polish. After another washing with water and a little cod or mineral oil treatment, the hide is rolled and ready for market.

All hair is washed in pure water and then dried by steam and sold for commercial purposes. The bulk of the lime is also saved, as it is valuable for fertilizer.

The flesh which is removed from the hides, known as fleshings, is mixed with lime and exported principally to glue manufactories.

The liquid wastes from the different vats is conducted outside to settling tanks, from which the sludge and deposit are removed and disposed of commercially if possible. The portion of the sediment that is of no value is spread on the fields owned by the Tanning Company and adjoining the works near Hare Creek. The liquids overflow from the basins into the tannery run.

It is reported that the consumption of the water at the works is about 150,000 gallons per day.

ANTHRAX EPIDEMIC.

Tannery Run and Hare Creek, as previously stated, pass through the farms of H. S. Ayers. The adjacent land is low, dry during a greater portion of the year, but flooded during freshets. This low land for a distance of a mile in length along the creek and a quarter to a half mile in width is used for pasturage and grazing purposes and is the best and only pasture land on Mr. Ayers farm with the exception of some meadow and cultivated fields. The owner maintains a dairy of between thirty and forty cows, five of which up to August 12th, 1907 (when the Department's officer made the inspection) had suddenly died of an illness lasting from six to ten hours; the symptoms in every case being practically the same.

Mr. Ayers employed Dr. C. C. McLean, of Meadville, to examine and treat his herd prior to August 12th. The cattle were vaccinated. The result of a post mortem examination of one of the cows satisfied Dr. McLean that the disease was anthrax and he had vaccinated the herd of cattle before the last one of the five cows died.

On the afternoon of August 12th, the Doctor, at the request of the Department's representative, made a post mortem examination of the body of the fifth cow in the presence of the said representative and diagnosed the case as anthrax.

Of the four cattle that had died before Mr. Wheelock came on the premises, one had been cremated and the other three buried. Mr. Wheelock immediately ordered that the three buried bodies should be exhumed and cremated. Between August 12th and 20th Mr. Ayers lost another cow and a horse from apparently the same disease and up to October 7th his total loss was three horses and nine cows during the season. Mr. Ayers affirmed that ever since the tannery wastes were discharged into the stream, he has lost cows and horses each year in varying numbers; but that the loss this year has exceeded that of previous years.

Mr. A. G. Johnson, who owns a farm along the creek below the Ayers estate affirmed that two of his cows were taken sick in August of this year; but that by applying vigorous treatment and removing the cattle from the stream he has prevented any loss in his herd. However, one of his cows died about three years ago. An examination showed the stomach to be nearly destroyed. This was attributed to the poisonous matters in the creek waters.

A Mr. Miner, residing on the Wilcox farm, adjoining that of Ayers, also lost a cow the first week in August of this year. He discovered the animal lying dead under a tree in the field. Mr. Wheelock directed that the body should be cremated.

About three years ago Mr. Raymond, owner of a farm below that of Ayers, lost a cow which had broken out of his pasture into the field of Ayers. The animal dropped in its tracks and died while being driven home from the Ayers pasture. The symptoms bore resemblance to those of anthrax.

BACTERIOLOGICAL TESTS AT HOWARD TANNERY.

The following tests of water and blood were made by Dr. Herbert Fox, of the Department Laboratories from samples collected by Mr. Wheelock and Dr. McLean on August 12th and received at the laboratories the next day.

Sample.	Water Sample.	Bac. per c. c.	Colon per c. c.	B. Anthracis.
1	From vats where hides first soaked in water,	600,000	3,000	Present.
2	Same as No. 1,	700,000	8,000	Present.
3	From settling basin outside,	500,000	1,600	Present.
4	Same as No. 3,	540,000	1,000	Present.
5	Tannery Run 400 ft. below works,	400	6	Negative.
6	Same as No. 5,	300	0	Negative.

BLOOD SAMPLE.	
7 From Thoracic Cavity, Cow disected Aug. 12.	Typical rod shape micro-organisms resembling B. anthracis virulent to guinea pigs.
8 From spleen same animal,	

SPRING CREEK TANNERY.

Spring Creek tannery, previously mentioned, is located on the north side of Broken Straw Creek in the lower part of the village of Spring Creek and about 200 feet from the stream. The plant is owned and operated by the Howard Brothers, has a capacity of about 100 hides daily. The same process of tanning is used as at the works on Hare Creek.

A settling basin receives the liquid refuse from the plant, the overflow therefrom being into an open ditch leading into Broken Straw Creek. The Department's representative made an inspection here on September 14th and collected two samples of the overflow from the basin. He also collected four samples from the Howard Tannery.

It was ascertained at that time that Mr. George White, owner of a farm one and one-half miles below Garland, was inconvenienced by the sickness of ten of his cows in July and August of 1906, which sickness occurred while the herd was pastured in the fields through which Broken Straw Creek flowed. After the cows were removed from the field, they recovered. The trouble was attributed to tannery pollution.

The common testimony of the farmers along the stream is that the waters thereof are grossly contaminated at intervals that fish are killed thereby, and that the odors are a nuisance.

BACTERIOLOGICAL TESTS AT SPRING CREEK TANNERY.

Sample.	Water Sample.	Bac. per c. c.	Colon per c. c.	B. Anthracis.
1	Overflow settling basin,	5,400,000	20,000	Positive probably.
2	Same as No. 1,	7,500,000	.....	Positive probably.
	FINAL TESTS HOWARD TANNERY. Samples Collected September 14th.			
3	From vats where hides first soaked in water (Domestic hides),	270,000	0	Tube broken.
4	Same as No. 3 (China hides),	100,000	0	Negative.
5	From outside settling tanks,	13,000,000	33,000	Positive probably.
6	Overflow from settling tanks,	20,000,000	.....	

DISCUSSION.

Owing to the fact that the special tests of the water samples taken from the overflow from both tanneries showed the presence of sewage in the water and of B. Anthracis; and to the fact that these waters are discharged into streams

which pass through farming territory in which cattle are pastured and have access to the water for drinking and wading; and to the fact that some of the riparian owners have suffered the loss of horses and cows or have been damaged in their business owing to sickness in their herd; and since the disease has been diagnosed as anthrax and tests of the blood of an animal afflicted revealed the preence of the anthrax germ; and since this disease is fatal to both man and beasts; and since the dairy products from the farms bordering the streams poisoned by the tannery refuse are sold for public consumption; and stock raised on the farms is slaughtered for the market; it was determined to be clearly in the interests of the public health and essential and imperative that the pathogenic poisons from the tanneries shall cease to be discharged into the waters of the State.

The anthrax organism is known to be hardy and long lived. By some writers it is claimed that the germ will lie dormant in the soil for several years. Its presence may be found in the deposits along the streams and on the fields overflowed in freshets. How great a menace the distribution of this poison and sewage from the tanneries causes cannot be demonstrated. It is a matter for conjecture, but the peril is not slight.

PRECAUTIONARY MEASURES.

On October 24, 1907, the Commissioner of Health sent the following communication to J. W. & A. P. Howard & Co., Ltd., Corry city, Erie county, Pa.

"Gentlemen: As you have been made aware, this Department has been investigating the matter of the pollution of the streams in and about Corry in relation to the prevalence of disease among cattle pastured along the banks of the stream. This is to notify you that the wastes from your tanneries at Columbus township and Spring Creek township, Warren county, which wastes are being discharged into the waters of the State, have been found by us to contain sewage organisms in large numbers and B. Anthracis, a virulent and deadly infection fatal to both man and beast. Furthermore, that the evidence collected support the contention that the cattle pastured along the streams into which the tannery sewage flows directly or indirectly, are menaced in life and health thereby, and that such cattle as have suddenly sickened and died from the disease diagnosed as anthrax, probably contracted said disease by reason of the discharge of tannery waste into the waters of the State."

"I have determined that it is necessary in the interests of public health that all tannery refuse and sewage cease to be discharged either directly or indirectly into Broken Straw Creek or any tributary thereof, and I hereby notify you of the importance of submitting for approval, not later than December 1st, 1907, plans for the purification of the tannery sewage and the sanitary disposition of all deleterious wastes from the works. An early reply will be greatly appreciated."

At the expiration of this time, December 1st, 1907, the company was engaged in making alterations and preparing plans for adequate treatment works.

It was determined that until such time as the sewage from these tanneries shall have been taken out of the streams and properly disposed of, the general public in the district should be warned that the water from these creeks is unfit for use by man and beast. Therefore the supervisors of Columbus, Spring Creek, Pittsfield and Broken Straw township, and the officers of the borough of Youngsville, Warren county through which the tannery polluted streams flow were directed and advised by the Commissioner of Health that whenever a public road crosses such streams proper guards or fences should be placed so as to prevent the use of the waters. Furthermore, a precautionary notice over the signature of the Commissioner of Health was posted at each such crossing by the local health officers.

Warning notices were published in local newspapers in the valley and a personal letter was mailed to the head of the family of every occupied farm bordering on the tannery polluted stream. The following letter is similar to that sent by the Commissioner of Health to every riparian owner in the valley:

"Mr. Fred McIntyre,
"Pittsfield, Pa.:

"Dear Sir: Mr. O. D. Horn, the Health Officer in Spring Creek and Pittsfield townships, Warren county, Pa., informs me that you are the owner or occupant of a farm in Pittsfield township, Warren county, said farm abutting Broken Straw Creek or through which farm said Broken Straw Creek or its tributary flows. Such stream or tributary is polluted by sewage from the Howard Brothers Tannery. You will notice by local newspapers a warning relative to the use by man or beast of the waters so polluted. You are probably aware of the fact that anthrax has broken out among cattle pastured along these streams. This Department has been investigating the matter and has discovered the existance of the anthrax germ in liquids discharged from the Howard Brothers Tannery. It is possible for the disease to be transmitted to

human beings. Pollution of milk, cream or butter by external contact is also possible. You should be extremely careful to keep your cattle out of such polluted streams. I may add that this disease is often contracted by cattle that graze in fields where the germ has been deposited or is in existance. I have taken up the matter of the discontinuance of the pollution of the waters of the State by tannery sewage, with the Howard Brothers and such pollution must cease. I have also requested the mayor of Corry city to consider plans for the purification of the sewage of that place before the effluent gets into the stream. Not because such pollution has caused the anthrax epidemic, but because the streams should be preserved in their purity for the use of man or beast. The art of treating sewage and rendering it harmless has developed to such an extent that it is now possible and practicable for municipalities to treat sewage and empty purified water only into the rivers and waters of the State.

A similar communication to this is being sent to all riparian owners along Broken Straw Creek.

Yours very truly,
SAMUEL G. DIXON."

The following letter was sent on October 24th, to Mr. H. S. Ayers:

"Dear Sir: This is to inform you that I have this day notified the tannery and the city to submit plans for some other disposal of sewage than into the waters of the State; and meantime I am notifying the public through the press to prevent domestic animals from drinking the waters of these streams and I shall post notices along the streams, individually communicate with each farm owner or occupant and do all those things demanded in the interests of the public health that I have authority to do in such matters. I trust the time will come when public sentiment will acclaim so loudly against the defiling of the waters which man and beast must use, that the practice of putting sewage into streams will cease. This Department is doing all it can in this work. I am,

Yours truly,
SAMUEL G. DIXON."

The following warning notice was advertised in the newspapers:

"Commonwealth of Pennsylvania,
Department of Health.

WARNING.

"The waters of Broken Straw Creek and its tributaries below Corry city which receive the present sewages are a menace to the lives and health not only of man but of beasts that drink the waters or bathe therein. It has become apparent from particular investigations in the valley of said creek that the interests of public health demand that pending the adoption of some other means of sewage disposal the streams mentioned should not be used for domestic purposes, and that cattle should not be permitted to wade in or drink such waters. The public, therefore, will take notice and be governed accordingly.

SAMUEL G. DIXON,
Commissioner of Health."

Harrisburg, Pa., October 24th, 1907.

The following is a copy of the letter dated October 24th, 1907, and sent by the Commissioner of Health to the Mayor of Corry city:

"My Dear Sir: This Department will be glad to consider for approval, plans for the treatment of the city's sewage; more especially since the pollution of the stream into which it is discharged is a menace to health not only of the beasts that graze in the pastures abutting the stream and drink of its waters, but man himself who uses the milk, cream and butter and the flesh of such animals for food.

"The prevalence of anthrax among cattle owned by the farmers whose properties are along the stream below Corry city complicates the danger and in taking cognizance of the circumstances and moving to bring about a cessation of the pollution by tannery sewage, the State must consistently require the municipal corporations to do likewise.

"I am about to notify the public in Broken Straw Creek Valley to desist from using for domestic purposes, and to prevent animals from drinking the waters of this stream or tributaries into which municipal and tannery sewage is discharged."

CONCLUSIONS.

It appears that at both tanneries there is a tank but that it is not a suitable receptacle to receive the offal, refuse, tan bark and the liquid or water therefrom. If it were a suitable receptacle, sediment would be prevented from passing into the waters of the State, which is not the case. Under the law of 1876 even if the present vats were in operation to their highest efficiency, they would not

constitute suitable arrangement. The use of chemicals in clarifying sewage was widely known in America and Europe at the time the laws relating to tannery refuse treatment were passed. Most of the sedimentation tanks built then were operated in connection with chemicals to clarify the liquids by rapid precipitation of the solids.

To-day, by reason of the great advancement in the art of treating and clarifying sewage and industrial waste, it is practicable to absolutely prevent any sediment from reaching any stream, and in the use of such process by proper design and operation, the pathogenic organisms may be intercepted. Therefore, the question of whether a tannery proprietor shall adopt works for the purification of the liquids to a degree sufficiently to render a stream into which they are discharged, a pure and wholesome stream of water, fit for reasonable use vested in riparian ownership, ought not to be a very wide open question. These and other considerations were had in mind at the time the order was issued to the tannery company to prepare plans for the purification of the waste. No disposition has been evinced on the part of the company to resist the Department. On the contrary the co-operation of all concerned will to all appearance bring about an early and satisfactory solution of the problem.

VI. REFERENCES TO SPECIAL COUNSEL.

The prosecution of the work of removing sources of sewage pollution of the streams in the State on complaint or petition, as elsewhere described, has been extensive, but the references to special counsel for criminal proceedings has been limited during the year 1907, owing to pendency of the appeal of the defendant in the case of Commonwealth vs. Edward Emmers, who had been tried and found guilty on the charge of pollution in the Quarter Sessions of Montgomery county in June of the previous year. As this was the first prosecution brought under the Purity Water Act, so-called, of 1905, it was necessarily a test case and after the verdict of guilty in 1906 had eliminated all questions of fact, the whole cause resolved itself into a question of the validity of the Act under the Constitution, both State and National.

Although the appeal in the Superior Court was argued in November, 1906, the opinion of the Court was not handed down until the following February, at which time the court without a dissenting opinion affirmed the judgment of the court below. The opinion of his Honor, Judge Porter, is lengthy and goes into every contention made by the defendant fully and establishes unequivocally the right of the State to enact legislation in the nature of police regulation, prohibiting in some cases the pollution of its streams by sewage and exercising the necessary control to prevent such pollution in other cases. The opinion in full is as follows:

IN THE SUPERIOR COURT OF PENNSYLVANIA.

Commonwealth
vs.
Edward Emmers.

No. 206, October Term, 1906.
Appeal from Court of Quarter Sessions of Montgomery county.

Filed February 25th, 1907.

Porter, J.

"The defendant was indicted and convicted, under the provisions of the Act of April 22d, 1905, P. L. 260, entitled "An act to preserve the purity of the waters of the State, for the protection of the public health," of the offense of discharging sewerage into the Schuylkill River. The specifications of error raised but two questions. Does the statute under which the defendant was convicted violate the Fourteenth Amendment of the Constitution of the United States, which declares that "No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any state deprive any person of life, liberty or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws?" Does the statute contravene section seven, article three of the Constitution of Pennsylvania, which prohibits the legislature from passing any local or special law, "granting to any corporation, association or individual any special or exclusive privilege or immunity?"

The first section of the statute in question defines the term "waters of the State," whenever used in this act, as including "all streams and springs, and all bodies of surface and ground water, whether natural or artificial, within the boundaries of the State." The second section requires every municipality, private corporation, company and individual, supplying or authorized to supply water to the public, within the State, to file with the Commissioner of Health a certified copy of the plans and surveys of the water works, and a description of the source from which the supply of water is derived; and forbids the subsequent use of any additional source of supply, without a written permit from the Commissioner of Health. The third section forbids any municipal corporation, private corporation, company or individual to construct water works for the supply of water to the public, or extend the same, without a written permit to be obtained from the Commissioner of Health, if, in his judgment, the proposed source of supply appears to be not prejudicial to the public health; this section provides for the filing of an application for the permit; to construct or extend such water works, with a description of the source from which it is proposed to derive the supply, and gives to the applicant, in case the Commissioner of Health shall refuse the permit, the right to appeal, within thirty days, to the Court of Common pleas of the county, which court shall, after a hearing make an order approving, setting aside or modifying the decision of the Commissioner of Health, or fixing the terms upon which said permit shall be granted. The sections of the statute upon which the learned

counsel for the appellant bases his argument that the act offends against the Constitution of the United States and the Constitution of the State of Pennsylvania are as follows:

"Section 4. No person, corporation, or municipality shall place, or permit to be placed, or discharge, or permit to flow into any of the waters of the State, any sewerage, except as hereinafter provided. But this act shall not apply to waters pumped or flowing from coal mines or tanneries, nor prevent the discharge of sewerage from any public sewer system, owned and maintained by a municipality, provided such sewer system was in operation and was discharging sewerage into any of the waters of the State at the time of the passage of this act. But this exception shall not permit the discharge of sewerage from a sewer system which shall be extended subsequent to the passage of this act. For the purposes of this act, sewerage shall be defined as any substance that contains any of the waste products, or excrementitious or other discharges from the bodies of human beings or animals."

"Section 8. All individuals, private corporations, and companies that, at the time of the passage of this act, are discharging sewerage into any of the waters of the State may continue to discharge such sewerage, unless in the opinion of the Commissioner of Health, the discharge of such sewerage may become injurious to the public health. If at any time the Commissioner of Health considers that the discharge of such sewerage into any of the waters of the State may become injurious to the public health, he may order the discharge of such sewerage discontinued."

"Section 9. Every individual, private corporation, or company shall discontinue the discharge of sewerage into any of the waters of the State, within ten days after having been so ordered by the Commissioner of Health." The tenth section makes it a misdemeanor, punishable by fine or imprisonment, or both, to discharge sewerage into the waters of the State contrary to the provisions of this act.

"Section 11. Any order or decision, under this act, of the Commissioner of Health, or that of the Governor, Attorney General and Commissioner of Health, shall be subject to an appeal to the Court of Common Pleas of the county wherein the outlet of such sewer or sewer system, otherwise prohibited by this act is situated; and the said court shall have power to hear said appeal, and may affirm or set aside said order or decision, or modify the same, or otherwise fix the terms upon which the permission shall be granted. But the order or decision appealed from shall not be superseded by the appeal, but shall stand until the order of the court, as above."

"The defendant is the owner and operator of a hosiery mill, situated on or near the bank of the Schuylkill River, in Montgomery county, where he employs from one hundred and fifty to two hundred men and women. There are in the mill nine water closets, for the use of these employes, the sewerage from all of which is by a single pipe conducted from the mill and flows into the waters of the Schuylkill River. This condition existed at the time the statute in question became a law, and the Commissioner of Health, on February 9th, 1006, served upon the defendant a notice that this discharge of sewerage was injurious to the public health, and requiring that the same be discontinued within ten days, as provided by the eighth and ninth sections of the statute. The defendants neither abated the nuisance nor appealed from the decision of the Commissioner to the Court of Common Pleas, as under the provisions of the statute he had the right to do, and under the provisions of this statute, the discharge of such sewerage into the Schuylkill River became, after the expiration of ten days, unlawful. The only question is whether this statute is a valid exercise of legislative power. The appellant contends that because the statute permits water from coal mines or tanneries and the sewerage from any public sewer system owned and maintained by a municipality, provided such sewer system was in operation and was discharging sewerage into any of the waters of the State at the time of the passage of the act, to continue, to flow into the waters of the State, while forbidding individuals, private corporations and companies to discharge into the waters of the State sewerage of the character designed by the act, the law is obnoxious to the constitutional provisions.

"The only alleged privilege or immunity of the appellant with which the statute in question could possibly interfere is that of discharging sewerage from his land into a stream which constitutes one of its boundaries. The right of the defendant to navigate the waters of the State remains unabated. His right to use the water to supply the natural wants of those lawfully upon the land, or to consume it for manufacturing purposes is not affected by this legislation. The alleged right of a riparian owner to pollute the waters of a stream which flows over his land or along the boundary thereof is not among the privileges and immunities which belong to him as a citizen of the United States, as distinguished from those of a citizen of the state in which the land and the stream are situated. This statute does not, therefore, fall within the prohibition of the first clause of the fourteenth amendment of the Constitution of the United States, which declares that "No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States;"

Slaughter House Cases, 16 Wallace 36; Bradwell vs. Illinois, 16 Wallace 130; Giozza vs. Tierman, 148 U. S. 67; Commonwealth vs. Finn, 11 Pa. Superior Ct. 620.

"The appellant does not contend that this act violates the second clause of the fourteenth amendment which provides that "nor shall any state deprive any person of life, liberty or property, without due process of law" and it is manifest that such contention could not, if made, be sustained. The ownership of riparian lands does not involve the ownership of the waters which flow over or along the margin of such lands. The owner of the land has a right to use the water for certain lawful purposes and this right is a natural one, inherent in the ownership of the land, but he can in no sense be said to have an absolute ownership of the water, as such. He has a right to the ordinary use of the water of the stream for the purpose of supplying the natural wants, for such things as are necessary to the preservation of life and health, of those occupying the land; even if such uses result in a substantial diminution of the stream. His right to use the water of the stream for manufacturing or other purposes, having no necessary relation to the use of his land, is limited to so much of the water as will not materially or sensibly diminish its quantity; Haupt's Appeal, 125 Pa. 211; Lord vs. Meadville Water Company, 135 Pa. 122; Railroad Company vs. Pottsville Water Company, 182 Pa. 418; Filbert vs. Dechart, 22 Pa. Superior Ct. 362. The riparian owner must permit the water to flow, subject to the diminution of its quantity resulting from these reasonable uses, in its natural channel, unpolluted, to lower riparian owners, who take it subject to the same rights and the same restrictions. The erection of anything in the upper part of a stream of water, which poisons, corrupts or renders it offensive and unwholesome, is actionable; Howell vs. McCoy, 3 Rawle 256; Wheatley vs. Chrisman, 24 Pa. 298; McCallum vs. Germantown Water Company, 54 Pa. 40; Commonwealth ex rel. vs. Russell, 172 Pa. 506. When, in development of the natural resources of the land, the water from a mine must necessarily and unavoidably pass into a stream, and that consequence could only be avoided by an expenditure which would amount to a practical prohibition of the development of the land, the injury to a lower riparian owner resulting from such unavoidable mixture of the water of the mine with that of the stream is a private injury for which there is no remedy; Sanderson vs. Pennsylvania Coal Company, 113 Pa. 145; but whether this extreme exception to the general rule that a riparian owner has no right to pollute the waters of a stream could prevail against the right of the public is an entirely different question; Commonwealth ex rel. vs. Russell. supra. There can, however, be no question in the present case. The pollution caused by the defendant did not result from the development of any natural resources of his land, nor was it unavoidagle. He never had a right recognized by law, to discharge sewerage, of the character shown in this case, into the stream which flowed past his land, he had, it is true, continued the practice for fourteen years, but it was from first to last a wrongful act and he took the chances of having to answer for the consequences. Had the practice resulted in an injury to a lower riparian owner the wrong would have been a private one, for which the individual or individuals injured might have had redress by action. If the public had a right to take from this stream pure and unpolluted water for drinking purposes, and found in it the germs of disease, coming from this sewer of the defendant, his offense would be a public one, for which he could be indicted and punished, at common law; Commonwealth vs. Yost, 197 Pa. 173. The defendant was not, prior to the enactment of this statute, possessed of a right of property, in the privilege of discharging this sewerage into the stream, recognized by law. He was not, therefore, deprived of "liberty or property," within the meaning of the second clause of the fourteenth amendment. But even if the defendant had a property right in the privilege of discharging sewerage into the stream, he was not by this statute deprived of that right "without due process of law." The statute provided that the defendant, because he had been so discharging sewerage prior to the approval of the act, should be permitted to continue the practice until, "in the opinion of the Commissioner of Health, the discharge of such sewerage may become injurious to the public health;" that upon notice of such decision by the Commissioner of Health the defendant should discontinue the discharge of sewerage within ten days, and that after that period the discharge of such sewerage should be unlawful. The Commissioner of Health is a sworn official, and it is presumed that, under his oath of office, his duties as the representative of the Commonwealth will be properly performed. The delegation by the legislature to a state officer, of the power to determine some fact or state of things upon which the law makes its own action depend, is not an unwarranted delegation of legislative power; Wilkes-Barre vs. Garrabed, 11 Pa. Superior Ct. 355. The law imposes upon the officer in question the duty of enforcing the health laws of the Commonwealth, and this statute clothes him with the power and imposes upon him the duty of ascertaining whether any sewer, maintained by an individual, company or private corporation, is discharging into the waters of the Commonwealth material which is a menace to the public health. The act does not make the decision of this official final, it gives the defendant the right of an appeal to the Court of Common Pleas, a constitu-

tional tribunal clothed with full law and equity powers, and gives him in that court an opportunity to be heard, upon the question whether or not the sewer so maintained involves danger to the public health. The statute placed at the disposal of the defendant this process of law to have determined in a court of competent jurisdiction the primary question, whether the material which he was discharging into the stream had become a menace to the public health; and before he could be convicted of the offense created by the statute he was entitled to a trial in the Court of Quarter Sessions, a court of record in which all misdemeanors are triable and the burden was upon the Commonwealth to establish that he had discharged sewerage into the stream, after the fact that such discharge involved a menace to the public health had been determined in the manner by the statute provided. The fourteenth amendment is not to be so construed as to deprive the states of the power to so amend their laws as to make them conform to the wishes of citizens as they may deem best for the public welfare without bringing them into conflict with the supreme law of the land, this power of change is limited by the fundamental principles laid down in the Constitution. "Due process of law," is process due according to the law of the land. This process in the states is regulated by the law of the State;" Walker vs. Sauvinet, 92 U. S. 90. The statute in question afforded the defendant a full and fair opportunity to have tried in a court of competent jurisdiction every question that arose, at the various stages of the proceedings, leading up to his conviction, the statute afforded to every individual, private company and corporation the same opportunity for a trial, under like conditions, in every case; and there can in this case be no allegation that the courts have denied any right which the statute conferred. The conviction of the defendant resulted from due process of law; Holden vs. Hardy, 169 U. S. 366.

"Does the statute contravene the provisions of the third clause of the fourteenth amendment "No state shall * * * deny to any person within its jurisdiction the equal protection of the laws?" The appellant contends that the act of 1905 conflicts with this provision of the Constitution of the United States, for the reason that it permits "water pumped or flowing from coal mines or tanneries, and sewerage from any public sewer system, owned and maintained by a municipality, provided such sewer system was in operation and was discharging sewerage into any of the waters of the State at the time of the passage of this act," to continue to be discharged into the waters of the State, provided that no such sewer system be extended subsequently to the passage of the act. The statute was passed in the exercise of the police power of the State. That power undoubtedly extends to all regulations affecting the health, good order, morals, peace and safety of society. All sorts of restrictions and burdens are imposed under this power, and when these are not in conflict with any constitutional prohibition, or fundamental principle, they canot be successfully assailed in a judicial tribunal. That the preservation of the waters of the State from pollution, involving danger to health is a proper subject for the exercise of the police power cannot be seriously questioned. Proceeding to an examination of the subjects excepted out of the operation of the statute, which exceptions the defendant asserts involve a denial of the equal protection of the laws, to those not within the exceptions, we must inquire whether the exceptions are founded upon substantial distinctions, having reasonable relation to the subject-matter of the statute. That there might be no question as to the kind of sewerage that the legislature intended to forbid individuals, companies and private corporations from discharging into the waters of the State, when it had been determined in the manner provided by the statute, that such discharge had become dangerous to the public health, the statute embodied a specific definition, in these words, "Sewerage shall be defined as any substance that contains any of the waste products, or excrementitious or other discharges from the bodies of human beings or animals." The exception of water flowing from coal mines was unnecessary, such water does not naturally contain any of the ingredients of sewerage as defined by the statute. The water flowing from a coal mine may contain sulphate of iron, sulphate of lime or other chemicals in solution, which would make it unpleasant for drinking purposes, and perhaps injurious to health, but it could not contain the specific germs of those diseases which sometimes abound in sewerage of the character defined by the statute. Should the water from a coal mine be mixed with sewerage of the kind prohibited, the compound would no longer be within the exception, but would come within the prohibition of the statute. The same rule is to be applied to water flowing from tanneries. Such waters would undoubtedly be offensive to both taste and smell, but the only waste products of animals which they would carry would be such as appertained to the hides. Those waste products had been long immersed in and saturated with chemical solutions, which give to them a character essentially different from the waste products of a slaughter house or the excretions of human beings. The waters flowing from the tannery are only within the exception so long as they remain unmixed with other materials. Whether the processes employed in the taning of hides would, if applied to sewerage of the kind to which this statute applies, result in the destruction of the germ life which it is asserted by science that the dejecta of human beings sometimes abounds, it is not for us to affirm or deny. One has

been subjected to a prolonged process in which powerful chemicals are made use of, and the other has not been subjected to such a process. It is not for the court to determine whether the classification adopted by the legislature was wise or unwise; we are only to inquire whether it is founded in substantial distinctions having some reasonable relation to the subject-matter of the legislation. "While the police power cannot be put forward as an excuse for oppressive and unjust legislation, it may be lawfully resorted to for the purpose of preserving the public health, safety or morals, or the abatement of public nuisances, and a large discretion is necessarily vested in the legislature to determine not only what the interests of the public require, but what measures are necessary for the protection of such interests;" Holden vs. Hardy, 169 U. S. 392; Lawton vs. Steele, 152 U. S. 133. What is necessary for the protection of the public health is primarily a legislative question. Whether the introduction of sewerage, of the kind prohibited by the statute, into the waters of the various streams of the Commonwealth by private individuals, companies or corporations, could be conducted in such a way, or with such secrecy, as to baffle ordinary inspection, or whether it involves such dangers to the public health as to require, for the protection of the people, the entire suppression of the business, rather than its regulation in such manner as to permit the discharge of such sewerage as does not involve danger to the public health, are questions of fact and of public policy, which belong to the legislative department of the government; Powell vs. Pennsylvania, 127 U. S. 678. The question in each case is whether the legislature has adopted the statute in the exercise of a reasonable discretion, or whether its action be a mere excuse for an unjust discrimination, or the oppression, or spoliation of a particular class. "From the very necessities of society, legislation of a special character, having these objects in view, must often be had in certain districts, such as for draining marshes and irrigating arid plains. Special burdens are often necessary for general benefits, for supplying water, preventing fires, lighting districts, cleaning streets, opening parks and many other objects. The regulations for these purposes may press with more or less weight upon one than upon another, but they are designed not to impose unequal or unnecessary restrictions upon any one, but to promote with as little individual inconvenience as possible, the general good. Though, in many respects, necessarily special in their character, they do not furnish just ground for complaint, if they operate alike upon all persons and property, under the same circumstances and conditions. Class legislation, discriminating against some and favoring others, is prohibited, but legislation which, in carrying out a public purpose, is limited in its application, if within the sphere of its operation it affects alike all persons similarly situated, is not within the amendment;" Barbier vs. Conley, 113 U. S. 31. The exemption of the water discharged from tanneries, which must be construed as including only the liquid resulting from the operation of tanning without the admixture of such sewerage as is prohibited by the statute, involved only a classification of the kind of sewerage with which the legislation dealt. I did not exempt the tanner from liability to answer to any lower riparian owner for any injury which the discharge of the water from the tannery might cause, nor did it exempt him from prosecution under the law as it formerly existed in case the discharge of the waters from this tannery became a public nuisance. The exemption was not limited to then existing tanneries, but this defendant or any other person who hereafter engages in the tanning business is entitled to its protection to the extent that it is not affected by this statute in any manner whatever.

"The classification adopted by the statute, as to the character of the sewerage prohibited and that exempted from the provisions of the act, was founded upon substantial and material distinctions, and was one which it was within the discretion of the legislature to make.

"When we consider all the circumstances involved, the distinction drawn by the statute between public sewer systems, owned and operated by municipalities, and sewers controlled by individuals and private corporations, would seem to be equally well founded. A municipality is a governmental agent, and although its existence is dependent upon the legislative will, while it exists it represents, within its sphere, the sovereign power of the State. The public sewer systems owned and maintained by the municipalities of the State have been constructed at the public expense and under express legislative authority. The necessity of providing some system of house drainage and of general sanitation for densely populated cities, and of providing for the inspection, regulation and control of those matters by the State or the municipalities, as the representatives of the State, in the interests of the public health had imperatively demanded the exercise of the police power of the State, and in the exercise of that power the legislature had authorized the construction of these public sewer systems. Any person whose property suffers an injury because of the discharge of such public sewer systems into the waters of the Commonwealth, is under the law of the State, entitled to compensation for such injury; Good vs. Altoona, 162 Pa. 493. The statute with which we are now dealing does not deprive the private owner of that right to compensation for injury to his property. These public sewer systems and the house drains which lead into them

have by the legislation of the State been made subject to the regulations, inspection and control of municipalities, and the duty of exercising such supervision has been imposed upon the municipal authorities. Density of population has been recognized as a proper basis for the classification of communities with regard to the necessity for and regulation of house drainage. "In its nature it is a definition and regulation of the police power on a subject which is one of municipal concern. All the cases agree that such subjects are the principal basis of the legitimate classification of cities. That the control and regulation of cesspools and drainage in general are more important and require different conditions in closely built up neighborhoods from those sufficient for the open country does not need discussion. And for the same reasons the regulations may require to be different in cities of different volume and density of population * * * The subject being one which is germane to the proper basis of classification its regulation and application to one or more classes are within the legislative discretion;" Beltz vs. Pittsburg, 26 Pa. Superior Ct. 66; 211 Pa. 561. This necessity for house drainage, under State inspection, regulation and control, in densely populated communities, was one of the elements of the problem which confronted the legislature when in the exercise of its discretion it determined that a necessity had arisen for the exercise of the police power to preserve the purity of the waters of the State, for the protection of the public health. If, as contended by the appellant, the only solution of the problem was to prohibit the discharge of all sewerage, under any conceivable circumstances and conditions, into the waters of the State; then the legislature had no discretion to frame an act which would, without unnecessary oppression of any individual, impose regulations to guard the public health against one source of danger unless it at the same time deprive the inhabitants of all densely populated communities of reasonable protection against another source of danger to the public health. Such a construction of the fourteenth amendment, would deprive the states of all power to make the police regulations necessary to meet the varying needs and dangers of the different districts and communities within their borders. The most densely populated city in the Commonwealth could not be permitted to discharge its sewerage into an estuary of the sea, unless at the same time all owners of riparian lands from where the waters of the State have their origin in mountain rivulets to where as rivers they meet the tides of the ocean were permitted, without State inspection, control or regulation, to pollute the waters for their own private profit. This contention of the appellant cannot be sustained. The authority of a State to make police regulations, to provide for the health of those residing in the different districts subject to jurisdiction and to classify those districts according to the widely varying circumstances and conditions therein prevailing, so long as that classification is based upon conditions having a substantial and reasonable relation to the general subject matter of the regulation, cannot be questioned, and such classification is not within the prohibition of the fourteenth amendment of the Constitution of the United States. "The question in each case is whether the legislature has adopted the statute in the exercise of a reasonable discretion, or whether its action be a mere excuse for an unjust discrimination, or the oppression, or spoliation of a particular class:" Holden vs. Hardy, 169 U. S. 398; Barbier vs. Conley, 113 U. S. 30. The power of a state, since the adoption of the fourteenth amendment, to enact a police regulation, for the protection of the public welfare, which restricts a noisome business or condition to certain districts, and reserves to the State, or its representatives, the right to regulate and control said business, is not within the prohibition of the amendment; Slaughter House Cases, 16 Wallace 36. The privilege of discharging obnoxious sewerage into the waters of the State is a matter of public concern, and it was within the police power of the State to declare that this privilege was one which ought not to be exercised by private individuals, but only by the State, or its governmental agents, the municipalities, acting under the direct control of the State. That the State reserve to itself the privilege, which it denied to individual citizens, did not deprive this appellant, or any other person, of the equal protection of the laws. This statute required every individual, corporation, or municipality supplying the public with water to file in the office of the Health Department of the State a statement of its source of supply. It requires every municipality which at the time of the adoption of the statute, was maintaining a system of sewerage, to file in that department a plan thereof. These provisions necessarily result in making a matter of public record, in the office of the Commissioner of Health, the sources from which the public water supply of every community in the State is taken, and a like record of every opening of a public sewer system into the waters of the State. Should an epidemic develop in any community, the health authorities immediately have accurate information as to the source from which the public water supply of that community is derived and, whether any public sewer system is discharged into that water. The State legislation requiring physicians in municipalities to make reports to the health authorities of all cases of diseases, will place at the disposal of the Commissioner of Health information as to the health conditions existing in the municipalities using the various public sewer systems.

The Commissioner of Health and officers under his control will thus constantly have a large part of the information necessary to deal with the health conditions of any community.

"The contention that this statute violates that clause of article three, section seven, of the Constitution of Pennsylvania, which declares that the General Assembly shall not pass any local or special law; "granting to any corporation, association or individual any special or exclusive privilege or immunity," cannot be sustained. Muncipal corporations do not come within this particular clause of the section, but are within the operation of the clause which relates to them specially and forbids the passing of any local or special law; "Regulating the affairs of counties, cities, townships, wards, boroughs or school districts." Municipal and quasi-municipal corporations are the agents of the State, authorized to perform such governmental duties as are by the State delegated, and there must be, from the very nature and purpose of their organization, delegated to them governmental powers, such as those of taxation and police, which it would be manifestly improper to delegate to an individual or private corporation. This is clearly recognized by this section of the Constitution, which places them in a distinct clause and constitutes them a class by themselves. Legislation which confers upon municipalities powers and privileges, properly relating to municipal affairs, while denying such powers to individuals and private corporations, does not violate that provision of the Constitution of the State which the appellant seeks to invoke; Commonwealth vs. Vrooman, 164 Pa. 306; Clark's Estate, 195 Pa. 520.

"The judgment is affirmed and it is ordered that the defendant appear in the court below to the end that the sentence be carried into execution."

Notwithstanding the opinion of the court in favor of the constitutionality of the Act (without a dissenting voice) the defendant immediately took an appeal to the Supreme Court. This once more left the question of constitutionality undecided and the position of the Department with regard to beginning prosecutions for the various pollutions reported by the inspectors was to a certain degree unsatisfactory. The cases referred to special counsel during the year, therefore, were limited to those already begun or those which were of such a nature as to be considered urgent.

The work done by Innes and Williams, attorneys-at-law of Philadelphia, during the year was personally performed by Louis J. Palmer, Esq. The cases may be as follows:

Carbon county,	2 cases.
Montgomery county,	4 cases.
Delaware county,	2 cases.
Chester county,	1 case.
	9 cases.

Four of the cases were abated after inspection and interview with the owner by the attorney. They were as follows: Frank Eckert, of Carbon county; Schuylkill Valley Traction Company of Montgomery county; William Lukins, of Delaware county and Phoenix Iron Company of Chester county.

There were three cases abated after return to court, namely, that of Tilghman Dreisbach, of Carbon county; Henry Brooks, of Montgomery county and Phineas Foley, of Delaware county.

There was one case in Montgomery county where evidence for prosecution was lacking and in the same county the attorney secured satisfaction of a lien for abatement by the Department in 1906.

In the three references brought to trial the State's case was established, either by a plea or verdict of guilty.

In the Frank Eckert case the charge was pollution of a natural water course on the watershed of the East Mauch Chunk Water Company. The occupant of the premises abated the nuisance by building a cesspool for waste water and refuse matters.

In the case of the Schuylkill Valley Traction Company of Montgomery county, the charge was pollution of a tributary of the Schuylkill River by overflow from cesspools on bank of the stream at the car barns at Norristown. The overflow pipe was disconnected.

In the Lukins case the charge was a nuisance arising from overflow of cesspools into a public highway. The overflow pipe was disconnected.

In the case of the Phoenix Iron Company, the charge was pollution of French Creek by direct drainage from privies. The abatement consisted of discontinuance of the use of the privies and the substitution of proper sanitary facilities.

With respect to the three cases which were tried, in the Driesbach case the charge was pollution of Pohopoco Creek above the intake of the Palmer Water Company by direct drainage from barnyard. At the time of trial the defendant on advice of his counsel, pleaded guilty. Sentence was suspended and the nuisance abated by the construction of a concrete wall about the barnyard.

In the Brooks case the charge was interference with an agent of the Commissioner of Health arising out of the inspection of a nuisance at a privy. Warrant was issued and the case returned to court. At the time of trial the defendant pleaded guilty and was sentenced to a fine and costs.

In the Foley case the charge was pollution of Cobbs Creek by drainage from pig pens. He was arrested in 1906, the trial was in March 1907, at which time a verdict of guilty was found on the evidence. Sentence was suspended pending abatement which defendant failed to do and in consequence was re-arrested in June and on trial was sentenced to pay a fine and costs. The nuisance was abated.

The cases referred to Frank M. Eastman, Esq., of Harrisburg, were as follows:

Elizabethtown Fertilizer Company, Donegal township, Lancaster county. Stream pollution. Referred to attorney February 1, 1907. Matter adjusted without arrest by company abating nuisance.

Spring Garden borough. Referred to attorney November 22, 1906, for failure to report and file plans of sewerage system. Matter finally adjusted by borough filing plans and report.

Riverton Consolidated Water Company. Referred to attorney July 18, 1907, for failure to file reports and plans of water works system and for furnishing impure water to consumers. Adjusted by company filing reports and plans, and making application for necessary improvements.

Paxtang Consolidated Water Company, Eastmere Water Company, Middletown and Swatara Water Company and Hummelstown Consolidated Water Company, all of Dauphin county. All of the above companies had failed to file reports and plans of the water works systems. Reference to counsel July 18, 1907. Cases adjusted by companies filing all necessary information.

Hollidaysburg, Blair county. November 26, 1906, notice of appeal from a permit of the Commissioner of Health and referred to attorney November 27, 1906. November 27, 1906, continues. January 19, 1907, agreement as to modification of decree and matter closed.

Norton Wagner, Roaring Brook township, Lackawanna county. Stream pollution. Date of information by M. K. Ely, April 15, 1907. Hearing April 16, 1907, before Alderman Millar. Defendant entered bail for court in the sum of $300. May 15 defendant abated nuisance and paid the costs.

Michael Doolic, Roaring Brook township, Lackawanna county. Stream pollution. Date of information, April 18, 1907, by William R. Teats. Date of hearing, April 18, 1907, before Alderman Millar. Defendant held in $300 bail for court. May term of court defendant pleaded guilty and was sentenced to thirty days in county jail from date of commitment.

Ira Turner, Spring Brook township, Lackawanna county. Stream pollution. Date of information November 24, 1907, by John J. Considine. Hearing before Magistrate Myron J. Kasson. Indictment by Grand Jury, September 9, 1907. Trial October 18, 1907. Non-suited.

W. W. Hall, South Abington township, Lackawanna county. Stream pollution. Date of information by William R. Teats before Alderman Millar. Hearing July 29, 1907. Defendant entered bail for court. Grand Jury gave true bill September 9, 1907. Trial October 18, 1907. Case nolle pros. on account of non-indictment.

A. J. Ackerly, South Abington township, Lackawanna county. Stream pollution. Date of information by William R. Teats, July 27, 1907. Hearing before Myron J. Kasson, July 29, 1907. Defendant entered bail for court. Grand Jury gave true bill September 9, 1907. Trial October 18, case nolle pros. on account of faulty indictment.

Ira Turner, Spring Brook township, Lackawanna county. Stream pollution. Information given before Alderman Millar December 30, 1907. Defendant entered bail for court.

Five cases were referred to the office of Robert S. Murphy, Johnstown, all of them being for stream pollution and in Cambria county. Information by E. T. Edwards.

Josiah Thomas, Jackson township; John W. Hess, West Taylor township; C. M. Birge, West Taylor township; Gilbert Gates, Lower Yoder township and Edward Weiss, Upper Yoder township.

On February 5, 1907, the above defendants had a hearing before Harry B. Manhart. Hearing continued until February 7, 1907. Messrs. Thomas, Hess and Birge pleaded guilty, paid costs and abated nuisances. Messrs. Gates and Weiss gave bail in the sum of $300. In the March term the Gates case was withdrawn upon payment of cost by defendant and abatement of nuisance.

Two cases were referred to Hon. W. Hugh Hensel of Lancaster, both being in Lancaster county and both for stream pollution. They were that of Abram Shelley, Rapho township and Aaron Stoner, of same township. They were reported abated on September 30, 1907.

To Hon. R. Scott Ammerman, of Danville, Montour county, was referred the case of Irwin Hunter, Mahoning township, for stream pollution from a bone-boiling establishment. Matter was adjusted out of court.

To James L. Marsteller, of Allentown, was referred the case of Samuel Schierer, of North Whitehall township, Lehigh county, for common nuisance.

To Joseph A. McCurdy, of Greensburg, Westmoreland county, was referred the stream pollution case of Ligonier township by Booth and Flinn. Matter will be settlled out of court.

VII. CONCLUSIONS.

There are two propositions which encompass the entire scope of the administration of the law for the preservation of the purity of the waters of the State for the protection of the public health in so far as the discharge of sewer systems is concerned and they are:

FIRST: The degree of safety which can be expected to be obtained in treating sewage for the removal of bacterial infection.

SECOND: The relative importance of sewage disposal plants and other health protective work, including treatment plants for water works, regarded in the light of the limited resources of the municipal corporations as defined by the constitutional limit of indebtedness, and of private corporations, as determined by water rates fixed by franchise or contract with the municipality.

In settling these questions in any particular case a thorough consideration of all the factors must be had. The policy of setting forth at length many of the reasons which govern the determinations of the Commissioner of Health, or the Governor, Attorney General and Commissioner of Health, in the case of sewage disposal, makes the decree quite voluminous, but it enables the local authorities to obtain an insight into the entire subject as viewed by the State Department of Health and is accepted as an eminently fair and satisfactory procedure. It has obviated the criticism of arbitrary exercise of power. At the close of the year it is believed that a continuation of the policy of publicity is fully warranted.

INDEX.

	Page.
Accounting and purchasing agent,	385
Ackerly, A. J., stream pollution,	955
Act to provide Tuberculosis Sanatoria and Dispensaries,	6
Actinomycosis to be reported,	8
Action of Colon Bacillus on sugar,	147
Advisory Board, action of,	7
Age, deaths by,	248,251
Allegheny, application for new sewage system for Allegheny City Home,	565
permit for new sewage system for Allegheny City Home,	569
Alliquippa, application for permission to install sewer system,	574
permit to install sewer system,	573,575
Ammerman, Hon. R. Scott, case referred to,	955
Annual Report of the Commissioner of Health, Second,	3
Anthrax, outbreak of, near Corry,	941
to be reported,	8
Antitoxin, Diphtheria,	355
forms for distribution,	365,366
history of distribution,	355
list of distributors by counties,	356,363
number of stations,	355
total number of cases treated,	355
treatment, immunizing,	380,381
number of syringes used, table,	382
percentage of deaths, diagram,	380
relation of initial, table,	370
result with relation to sex and age, table,	371
according to period of initial treatment after onset and age, table,	371
result according to areas affected, table,	372
by counties and months, table,	373,374
of subsequent treatments, table,	375
results of, according to number of units, table,	376
Application for advice relative to new water supply for Bethlehem, Northampton county,	473
to change outfall of system, Carlisle, Cumberland county,	609
to construct a new sanitary sewerage system, Allegheny, Allegheny county,	566
purification works, Greenville, Mercer county,	663
sewer outlet, Williamsport, Lycoming county,	797
for filter plant, Cambridge Springs, Crawford county,	479,482
for improvement of water supply Hummelstown, Dauphin county,	503
to increase source of supply, Chambersburg, Franklin county,	483
to modify permit, Osborne, Allegheny county,	726,728
for permit to extend sewers Bedford, Bedford county,	578
Blairsville, Indiana county,	584
Butler, Butler county,	593
Cambridge Springs, Crawford county,	595
Canton, Bradford county,	599
Coraopolis, Allegheny county,	628
Dunmore, Lackawanna county,	638
E. McKeesport, Allegheny county,	647
Ellwood City, Lawrence county,	654
Ford City, Armstrong county,	656
Harrisburg, Dauphin county,	668
Indiana, Indiana county,	674,677
Jeannette, Westmoreland county,	678
Johnsonburg, Elk county,	682,686
Kane, McKean county,	688,692,694

Page.
Application for permit to extend sewers, Lancaster, Lancaster county, 695,696,697
Lower Merion township, Montgomery county, ... 700
New Castle, Lawrence county, ... 708,710
Oakmont, Allegheny county, ... 719
Philadelphia, Frankford Creek Drainage District, ... 731
Pennypack Creek Drainage District, ... 734
Cobb's Creek Drainage District, ... 736
Main Delaware River Drainage District, 738
Schuylkill River Drainage District, ... 741
Pitcairn, Allegheny county, ... 747,750
Saltsburg, Indiana county, ... 759
Taylor, Lackawanna county, ... 769
Titusville, Crawford county, ... 773
Verona, Allegheny county, ... 773
Warren, Warren county, ... 781
Washington, Washington county, ... 788
Williamsport, Lycoming county, ... 795
Yorkville, Schuylkill county, ... 807
Water Works Bradford, McKean county, ... 476
Clarion, Clarion county, ... 486
E. McKeesport, Allegheny county, ... 490
Ellwood City, Lawrence county, ... 494
Indiana, Indiana county, ... 506
Lebanon, Lebanon county, ... 510,516
McKeesport, Allegheny county, ... 518
Ridgway, Elk county, ... 525
Steelton, Dauphin county, ... 542
Tarentum, Allegheny county, ... 550
Application for permit to install sewers, Alliquippa, Bedford county, .. 569,574
Warren, Warren county, ... 555
Baden, Beaver county, ... 575
Big Run, Jefferson county, ... 581
Bristol, Bucks county, ... 587
Carlisle, Cumberland county, ... 602
Chambersburg, Franklin county, ... 609
Chartiers Township, Allegheny county, ... 616
Chartiers township, Allegheny county, in district "A", ... 618
Coaldale, Schuylkill county, ... 621
Columbia, Lancaster county, ... 623
Cresson, Cambria county, ... 621
Derry, Westmoreland county, ... 635
East Mauch Chunk, Carbon County, ... 642
Edgeworth, Allegheny county, ... 650
Edinboro, Erie county, ... 652
Forest City, Susquehanna county, ... 661
Harrison township, Allegheny county, ... 670
Lower Towamensing township, Palmerton, Carbon county, ... 702
Marcus Hook, Delaware county, ... 705
Narberth, Montgomery county, ... 707
Newport, Perry county, ... 710,712
New Oxford, Adams county, ... 716
Polk, Venango county, State Institution for Feeble-minded of Western Pennsylvania, ... 753
St. Marys, Elk county, ... 755
Scalp Level, Cambria county, ... 761
Shaler township, Glenshaw Village, Allegheny county, ... 764
Summit Hill, Carbon county, ... 767
Versailles, Allegheny county, ... 777
Wall, Allegheny county, ... 779
Wyoming, Luzerne county, ... 799
Application for permit for water works, Baden, Beaver county, ... 470
Portland, Northampton county, ... 522
Swatara township, Dauphin county, ... 534,537
South Renovo, Clinton county, ... 538
Washington township, Franklin county, ... 561
Application to secure additional source of water supply, Franklin, Venango county, ... 495,496
for sewage disposal plants, ... 467
to treat sewage, Allegheny County Work House, Claremont, Allegheny county, ... 723
for water filtration plants, ... 468
water works, ... 468

	Page.
Appropriations for 1905-1906,	387
Arment, S. B., C. M. I., reports of scarlet fever in Columbia county,..	53
Reports of Typhoid fever in Columbia county,	49
Assistant Engineers, Charles H. Cummings,	457
Wm. H. Ennis,	456
Thomas Fleming,	457
F. L. Gardner,	457
Walter S. Hanna,	456
Ralph E. Irwin,	457
Harvey Linton,	457
John M. Mahon,	457
H. A. Otto,	457
C. A. Philippi,	457
John A. Schaeffer,	457
F. H. Shaw,	456
Reynold F. Spaeth,	457
Geo. H. Strode,	457
J. P. Wentling,	457
Frederick W. Witherell,	456
Atlas of Health Officers,	466
Austin, Investigation of water works,	458
Average Phagocytosis of Human and Elephant's Blood with B. Tub.,..	123
Bacillus Coli, contributions to differentiation of,	99,143
to study of in drinking water,	99
to study of in fishes,	99
Bacteriological tests of drinking water at Mt. Gretna,	832
of water at rifle range,	835
at camp meeting grounds,	843
at chautauqua grounds,	839
of water at military grounds,	852
of deep well water at military reservation,	856
of drinking water at picnic grove,	850
by U. S. Army,	839
at Howard Tannery,	943,944
of water at Ridgway,	934,935
at Spring Creek Tannery,	944
Baden, application for water works,	470
permit to install water works,	578
application for permission to install sewer system,	575
Barnesboro, typhoid epidemic at,	914
Bashore, H. B., C. M. I., report on smallpox in Cumberland county,..	43
Batt, Wilmer R., State Registrar,	4,155
address before Harrisburg Academy of Medicine, ..	37
annual report of,	155
Delegate to Conference of State and Provincial Boards of Health,	37
Bechtelsville, investigation of sewers,	458
Bedford, application for permit to extend sewers,	578
permit to install water works,	581
Ben Avon, examinations on application for sewerage,	458
Bernville, investigation of sewers,	458
Bethlehem, application for new supply,	473
Big Run, application to install sewers,	581
Biological Products, Division of,	353
Birdsboro, investigation of sewers,	458
Birge, C. M., stream pollution, paid costs,	955
Births, illegitimate,	255,328
number of,	31,255
males,	255
females,	255
plural, table,	330,331
by sex and months, table,	256,270
Blairsville, application to extend sewers,	584
permit to install water works,	587
Boroughs Boards of Health, visited,	61
Bouse, John A., Special Medical Inspector,	4
Boyertown, investigation of sewers,	458
Bradford, application to extend water works,	476
investigation of water works,	458
Bristol, application to install sewers,	587
permit to install water works,	592
Brooks, Henry, case abated after return,	954
Bryn Mawr, investigation of sewerage system,	458
Bubonic Plague, to be reported,	8

Page.
Bureau of Vital Statistics, report of, ... 155
fund of, ... 389
Burnham, typhoid epidemic at, ... 937
Butler, application to extend sewers, ... 593
permit to extend water works, ... 595
Cambridge Springs Borough, plans submitted, ... 458
application for filter plant, ... 479,482
application to extend sewers, ... 595
permit for filtration plant, ... 482
Cancer, deaths from, ... 179
Canton, application to extend sewers, ... 599
investigation of sewers, ... 458
permit to extend water works, ... 602
Card for bacteriological water analysis, ... 94
Carlisle, application for permit to install sewers, ...602,608,609
change outfall of sewer system, ... 609
permit to install sewers, ... 609
Causes and Classes, deaths from specified, ... 230,241
Cawley, Morris F., C. M. I., report on diphtheria in Lehigh county, .. 53
report on scarlet fever in Lehigh county, 52
report on typhoid fever in Lehigh county, 45
Central Bureau of Vital Statistics, ... 13
Centreport, investigation of sewers, ... 458
Cerebro-spinal Meningitis, to be reported, ... 8
Chambersburg, application for increased source of supply, ... 483
application to install sewers, ... 609,616
permit to install sewers, ... 615
Chartiers township, Allegheny county, application to install sewers,,616,618,620
application to install sewers in District "A", ... 618
permit to install sewers, ... 620
examination on application for sewerage, ... 458
Chemical examination of deep well water, military reservation, ... 856
Chester Creek, ... 871
Chicken-pox, to be reported, ... 8
Chief Draftsman, J. L. W. Gibbs, ... 457
Chief Sanitary Field Inspector, Moses K. Ely, ... 457
Cholera, to be reported, ... 8
Cities and Boroughs, death rates of, ... 164,166
Claremont, Allegheny county, Allegheny County Work House, appli-
tion to treat sewage, ... 723,726
permit to install sewage system, ... 569,726
Clarion, investigation of water works, ... 458
application for extension of, ... 486
permit for extension of, ... 489
Classified deaths by municipalities, ... 251,254
Clearfield, investigation of sewage, ... 458
Cleaver, Israel, C. M. I., report on typhoid fever in Berks county, ... 46
Coaldale, application to install sewers, ... 621,623
permit to install sewers, ... 623
Cobb's Creek Drainage District, Phila., application to extend sewers, ...736,746,747,748
permit to extend sewers, ... 747
investigation of pollution of, ... 458
Coleman Estate, ... 834
Colon Bacillus, action of, on sugar, ... 147
Color, deaths by, ... 248,251
Columbia, application to install sewers, ... 623,627
permit to install sewers, ... 627
Commissioner of Health, Second Annual Report, ... 3
address at Syracuse, N. Y., ... 36
before Legislative Club of Harrisburg, ... 36
before point committee Health and Sanitation, ... 36
oration on State Medicine, A. M. A., ... 36
Commonwealth vs. Edward Emmers, ... 948
Communicable diseases, report of, ... 39,335
rates per 100,000 table, ... 336,338
Communication to President, Cornwall and Lebanon Railroad Company, ... 848
Elk Tanning Company condemning spring, ... 936

Page.

Communication to County Commissioners Elk county condemning county spring at Ridgway, ... 935
Secretary, Ridgway Board of Health calling attention to cautions relative to water supply, ... 937
Managers, Ridgway Hospital, condemning hospital spring, ... 935
Ridgway Brick Company, condemning spring, ... 936
Ridgway Dynamo and Engine Company, condemning spring, ... 936
Ridgway Machine Company, condemning ground waters, ... 936
Comparative Phagocytosis of Human, Bovine and Rodent blood with B. tub., ... 122
Complaints of dead animals, ... 462
insanitary premises, ... 462
nuisances, ... 462
sewage and drainage, ... 462
slaughter houses, ... 462
stream pollution, ... 462
swamp lands, ... 462
polluted water supply, etc., ... 462
well pollution, ... 462
Conewago Creek, ... 833
not suitable for domestic uses, ... 839
Conferences, conventions and addresses, ... 36,37
Conewago Lake, condemned as source of drinking water, ... 827
Contributions to differentiation of B. Coli, ... 99
the study of B. Typh. and B. Coli, ... 99
Coraopolis, application for permit to extend sewers, ... 628,630
permit to extend sewers, ... 630
examinations on application for sewerage, ... 458
Corporation, reports to be filed with Commissioner of Health, ... 461
Corry, anthrax near, ... 941
Corry Tannery, investigation of sewage of, ... 458
County Medical Inspectors, list of, ... 11
Cows, effects of serum extract on, ... 113
Cresson, application to install sewers, ... 621,634
permit to install sewers, ... 637
Croup, diphtheritic, to be reported, ... 8
membranous, to be reported, ... 8
Crum Creek, ... 871
Darby Creek, ... 871
Dauphin Consolidated Water Supply Company, plans submitted, ... 458
Davis, Samuel T., member of Advisory Board, ... 8
Decrees or permits for additional source of water supply to Franklin, Venango county, ... 496,502
Lebanon, Lebanon county, ... 517
to construct new sanitary sewerage system for Allegheny City Home, ... 569
to extend water works, Bedford, Bedford county,. 581
Blairsville, Indiana county, ... 587
Butler, Butler county, ... 595
Canton, Bradford county, ... 602
Chambersburg, Franklin county, ... 485
Clarion, Clarion county, ... 489
E. McKeesport, Allegheny county, ... 493
Indiana, Indiana county, ... 510
Lebanon, Lebanon county, ... 515
McKeesport, Allegheny county, ... 522
Ridgway, Elk county, ... 532
Steelton, Dauphin county, ... 549
Tarentum, Allegheny county, ... 554
Warren, Warren county, ... 560
for filtration plant, Cambridge Springs, ... 482
to install water works, Baden, ... 578
Bradford, ... 478
Bristol, ... 592
Portland, ... 524
South Renovo, ... 542
Swatara township, Dauphin county, ... 537
Washington township, Franklin county, ... 562

Page.

Decrees or permits to extend sewers, Coraopolis, Allegheny county,... 630
Dunmore, Lackawanna county, 641
Edgeworth, Allegheny county,. 650
Ellwood City, Lawrence county, 655
Ford City, Armstrong county,.. 661
Fort Pitcairn, Allegheny county, ... 749
Harrisburg, Dauphin county, .. 670
Indiana, Indiana county, ... 678
Jeannette, Westmoreland county, ... 681
Lancaster, Lancaster county,.. 695
Lower Merion township, Montgomery county, ... 702
New Castle, Lawrence county,. 709
Oakmont, Allegheny county, .. 723
Philadelphia, Cobb's Creek Drainage District, ...738,746,747
Frankford Creek Drainage District, ...734,744,745,746
Main Delaware River Drainage District, ... 740,744
Pennypack Creek Drainage District, ... 735
Schuylkill River Drainage District, ... 743,744
Saltsburg, Indiana county,..... 761
Taylor, Lackawanna county,... 772
Titusville, Crawford county,.... 773
Verona, Allegheny county, ... 776
Washington, Washington county, ... 794
Williamsport, Lycoming county, 797
for extension of time, New Castle, Lawrence county, ... 710
Decrees or permits to install sewers, Alliquippa, Bedford county, ... 513,575
Carlisle, Cumberland county, .. 608,609
Chambersburg, Franklin county, 616
Chartiers township, Allegheny county, ... 618,620
Coaldale, Schuylkill county, ... 623
Columbia, Lancaster county, ... 627
Cresson, Cambria county, ... 634
Derry, Westmoreland county, .. 637
East Mauch Chunk, Carbon county, ... 646,650
Edgeworth, Allegheny county,.. 650
Forest City, Susquehanna county, 667
to install sewage disposal works, Greenville, ... 667
to install sewers, Lancaster, Lancaster county, ... 700
Lower Towamensing township, Palmerton, Carbon county, ... 705
Narberth, Montgomery county, .. 707
Newport, Perry county, ... 716
New Oxford, Adams county, ... 718
Osborne, Allegheny county, ... 728,730
State Institution for Feebleminded, Polk, Venango county, 755
St. Marys, Elk county, ... 758
Scalp Level, Cambria county,... 764
Shaler township, Glenshaw, Allegheny county, ... 767
York, York county, ... 806
Wall, Allegheny county, ... 781
Yorkville, Schuylkill county, ... 809
for treatment of sewage, Allegheny County Work House, Claremont, O'Hara township, Allegheny county, ... 726
for plan for sewage disposal Pittsburg, Allegheny county, ... 752
to discharge sewage through existing sewers, White Rockland Company, Kane, McKean county, ... 694
to use existing sewers, Kane, McKean county,.... 695

	Page.
Death rate from cancer,	179
tuberculosis,	176
rates for certain cities and boroughs,	164,166
Deaths by age periods,	166
by sex and age periods,	163,209,221
by sex and months, table,	184,198
by sex and age, table,	209,221
by age, sex, color, general nativity and parent nativity,	248,251
from cancer,	179
from diphtheria by sex and age periods,	171
from measles,	173
from measles compared with registration area,	174
from measles by sex and age periods,	174
from tuberculosis,	175
from tuberculosis of the lungs,	176
from specified causes and classes,	230,241
from violence,	182
from whooping cough,	174
from whooping cough compared with registration area,	174
from whooping cough by sex and age periods,	175
from whooping cough by months,	175
by months and quarters,	162
Defective sewerage at the Capital of the State,	22
Degreased Bacilli, toxicity of,	101
Delaware River District, Main, Philadelphia, permission to extend sewers,	738,740,744,745,746
declivity of,	863
statistics for Pennsylvania,	862
Basin,	863
area and population of in Pennsylvania,	864
above Lehigh River,	865
population by counties,	864
below Philadelphia in Pennsylvania,	871
between Easton and Philadelphia in Pennsylvania,	867
between Easton and Philadelphia major pollutions,	867
municipalities on,	873
by districts having water works,	873
by districts having water systems,	873
operations of departments for removing sources of pollution	874
major pollutions below Philadelphia in Pennsylvania,	872
places having sewage purification works,	874
summary of data,	872,873
Dental Council, Commissioner member of,	6
Derry, application to install sewers,	635,637
Designs and construction,	811
Differentiation of Bacillus Coli Communis from allied species,	99,143
Digest of Sanitary Laws of the Commonwealth,	31,32,33,34,35,36
Dimmick, Benjamin, Mayor of Reading,	883
Diminution of death rate,	162
Diphtheria, case rate mortality by months,	171
to be reported,	8
mortality,	25
in Lehigh county,	53
deaths from in Pennsylvania,	170
comparison with registration area,	170
by months,	170
distribution of, table,	341
by nativity and age periods, table,	341
by color and age periods, table,	341
by sex and color, table,	341
number of cases of, table,	340
antitoxin, distribution,	355
number of stations,	355
list of distributors,	356,363
forms for distribution,	365,366
observations on the use of,	367
Diseases, to whom reported,	8
of the circulatory system,	180
of the digestive system,	181
of the genito-urinary system,	182

Page.
Diseases of the nervous system, ... 180
of the respiratory system, ... 181
death rate from, ... 181
Dispensaries fund, ... 392
tuberculosis, equipment, ... 57
list of, ... 59
list of physicians, ... 59
tabular report of, ... 60
Distribution of Antitoxin and Vaccines, Division of, ... 5
of intestinal and typhoid cases at Kittanning, ... 904
of vaccine, ... 383
Districts, sanitary, ... 460
Divisions of Department, ... 3
Division of Biological Products, ... 353
Accounts and Purchasing, ... 385
Antitoxin and Vaccines, ... 5
Laboratories and Experiment Station, ... 5
Medical Inspection, ... 3
operations of, ... 39
Morbidity Statistics, ... 4
Sanitary Engineering, ... 4,453
report of, ... 456
Store room, ... 15
of Tuberculosis Dispensaries and Sanatoria, ... 7
of Vital Statistics, ... 4
Dixon, Fluid of, ... 99,105
Dixon, Samuel G., Address before Health Officers of the State of New York, ... 36
Legislative Club of Harrisburg,.... 36
Joint Committee on Public Health and Sanitation, ... 36
Oration on State Medicine before the American Medical Association, ... 37
Delegate to Third International Sanitary Convention of American Republics, ... 37
Doolick, Michael, stream pollution, sentenced to imprisonment, ... 955
Drafting, ... 466
Draftsmen, Wilberforce Eckels, ... 457
J. W. German, ... 457
Robert Hunter, ... 457
Chester Hogentogler, ... 457
Gilbert Jay, ... 457
Max Matthes, ... 457
F. Marion Sourbeer, ... 457
C. K. Weigle, ... 457
Dreisbach, Tilghman, case abated after return, ... 954
Drinking water at Mt. Gretna, bacteriological tests of, ... 832
DuBois, investigation of sewage, ... 458
Dunkard Home, drainage of, ... 921
Dunmore, application to extend sewers, ... 638,641
permit to extend sewers, ... 641
Each specified cause, deaths from, ... 242-246
East McKeesport, application for extension of water works, ... 490
permit for extension of water works, ... 490
application to extend sewers, ... 647
examinations on application for sewerage, ... 458
Eastman Frank M., Esq., cases referred to, ... 955
East Mauch Chunk, application to install sewers, ...642,646,650
permit to install sewers, ... 646,650
investigation of sewers, ... 458
Eckert, Frank, case abated, ... 954
Edgeworth, application to install sewers, ... 650
permit to install sewers, ... 650
Edinboro, application to install sewers, ... 652
investigation of sewage, ... 458
Effect of serum inoculations on tuberculosis, ... 99
serum extract on tubercle bacillus, ...99,105,106
bile and pancreatic juice on tubercle bacilli, ... 103
repeated injections of tuberculin in healthy cows, ... 99,105
serum extract on tubercle bacillus, ... 109,113
on temperature, of tubercle extract and tuberculin injections, ... 109
routes of injection, ... 110
extracts on tuberculous guinea pigs, ... 110
Efforts at immunization, ... 110

Page.
Elephant's blood, reaction on tubercle bacilli, ... 99,121
Elizabeth Fertilizer Company, nuisance abated, ... 955
Ellwood City, investigation of water works, ... 458
application for extension of water works, ... 494
application to extend sewers, ... 654,655
permit to extend sewers, ... 655
Ely, Moses K., Chief Sanitary Field Inspector, ... 457
Emergency fund, ... 390
Engineering, ... 467
Engineering, Division of Sanitary, ... 4,453
office force, ... 456
Epidemic dysentery, to be reported, ... 8
of acute infantile paralysis, ... 30
of anthrax, ... 943
Epidemics, ... 882
Burnham, Conemaugh, Franklin, Corry, Huntingdon, Kittanning, Manheim, Ridgway, Scranton, Spangler, ... 882
Equipment, tuberculosis dispensaries, ... 57
Examinations of feces, ... 98
diphtheria cultures, ... 99
milk, ... 98
for malaria, ... 90
pathological fluids, ... 92
pathological growths, ... 92
of sputum, ... 90
urine, ... 92
water, ... 93
Widal test, ... 90
Erysipelas, to be reported, ... 8
Expenditures, ... 388,391
Experiments on cows, serum extract, ... 113
Farewell Village, investigation of water works, ... 458
Faulty design of filter at Kittanning, ... 903
Feces, examinations of, ... 98
Fever, scarlet, number of cases of, ... 341
Field inspection, ... 875
Financial report, ... 387
Findley, Joseph D., C. M. I., report on scalet fever in Blair county, .. 52
Fleetwood, investigation of sewers, ... 458
Fluid of Dixon, study of, ... 99,105
Fly screens at camps, ... 854
Focal Necroses produced by tuberculin, ... 102
Foley, Phineas, case abated after return, ... 954
Ford City, application to extend sewers, ... 656,661
permit to extend sewers, ... 661
Forest City, application to install sewers, ... 661,667
permit to install sewers, ... 667
Forms for distribution of diphtheria antitoxin, ... 365,366
Fort Pitcairn, decree or permit to extend sewers, ... 749
Fox, Herbert, Chief of Laboratories, ... 5
examinations by, ... 89
experiments on blood of elephants, ... 121
value of Liq. Cresol. Comp., ... 123
report of, ... 85
Foxburg Village, investigation of water works, ... 458
Frankford Creek drainage district, Phila., application to extend sewers, ...731,734,744,745,746
permit to extend sewers, 746
Franklin, investigation of water works, ... 458
application for extension, ... 495,496
permit to extend water supply, ... 502
Free, S. M., C. M. I., report of typhoid fever in Clearfield county, ... 48
Garbage disposal at camps, ... 854
Gates, Gilbert, stream pollution, paid costs, ... 955
General mortality, tables, ... 183
General Sanitation, ... 879
German measles, to be reported, ... 8
Germicidal activity of Liq. Cresolis Comp., ... 99
charts illustrating, ...127,128,129
Gibbs, J. L. W., Chief Draftsman, ... 457
Glanders, to be reported, ... 8
Glenshaw Village, Shaler township, Allegheny county, application to install sewers, ... 764,767
permit to install sewers, ... 767

Page.
Governor, Attorney General and Commissioner of Health to consider applications for sewerage, ... 564
Grant, F. D., Major-General, U. S. A., ... 853
Greenville, application for permit to construct purification works, ... 663
Greenville, Sewage Disposal Works, permit to install sewers, ... 667
Groff, James E., C. M. I., report on typhoid fever in Bucks county,... 45
scarlet fever in Bucks county, .. 51
Hall, W. W., stream pollution, ... 955
Hamburg, investigation of sewers, ... 458
Hare Creek, pollution of, by anthrax, ... 942
Harrisburg, application to extend sewers, ... 668,670
permit to extend sewers, ... 670
Harrison township, Allegheny county, application to install sewers,.... 670
Hartman, Paul A., C. M. I., reports on small-pox in Dauphin county, 43
typhoid fever in Dauphin county, ... 49
Hartzell, Charles, store-keeper, ... 15
Health Officers, ... 4,460
Hensel, Hon. W. U., cases referred to, ... 955
Hess, John W., stream pollution, paid costs, ... 955
Hill, Walter de la M., C. M. I., reports on small-pox in Bedford county, 45
Hollidaysburg agreement, ... 955
Howard Tannery, anthrax from, ... 942
Hughesville, examinations on application for sewerage, ... 458
Hummelstown Consolidated Water Company, adjustment, ... 955
application for water works, ... 458
improved source, ... 503
Hunter, Irwin, stream pollution, adjustment, ... 955
Huntingdon, filter plant of, ... 892
general description of drainage and sewage of, ... 889
source of water supply of, ... 890
typhoid fever epidemic at, ... 889
water works of, ... 890
Hydrophobia, to be reported, ... 8
Immunization, efforts at, ... 110
Improved rapid test for Indol, ... 99
method of sterilization of media, ... 99
Improvement of watersheds, ... 876
Improvement of water supply of Kittanning by Department, ... 905
Impure water and ice supply, investigations of, ... 463
Increased powers for protection of waters of the State, ... 563
Indiana, application to extend sewers, ...674,677,678
for permission to extend water works, ... 506
permit to extend water works, ... 510
Indol, rapid test for, ... 99,133
Infantile Paralysis, acute, epidemic of, ... 30
Innes & Williams, Attorneys-at-Law, ... 954
Investigations of nuisances caused by dead animals, ... 465
defective drainage, ... 464
insanitary premises, ... 464
mine drainage, ... 465
sewage in gutters, ... 464
sewerage systems, ... 464
slaughter houses reduction works, ... 465
swamps and stagnant water, .. 465
Jeannette, examination on application for sewerage, ... 458
application to extend sewers, ... 678,681
permit to extend sewers, ... 681
Johnson, Fred C., Chief Medical Inspector, ... 3
report of, ... 39
work at Kittanning, ... 894
work at Scranton, ... 882
Johnsonburg, application to extend sewers, ... 682,686
Juniata River, ... 938
Kane, investigation of sewage, ... 458
application to extend sewers, ...688,692,694,695
White Rock Land Co., decree or permit to discharge sewage through existing sewers, ... 694
Kittanning, intestinal and typhoid fever epidemic, ... 894
Klingensmith, T. A., C. M. I., report on typhoid fever in Westmoreland county, ... 51
Koenig, Adolph, member of Advisory Board, ... 8
Laboratory, research work, ... 99
examinations, for malaria, ... 90

	Page.
Laboratory examinations for pathological fluids,	92
pathological growths,	92
of sputum,	90
urine,	92
water,	93
Widal test,	90
Lancaster, application to extend sewers,	695,696,697,700
permit to extend sewers,	695
Latta, S. W., Chief Medical Inspector, P. R. R.,	11
Lawn, typhoid fever at,	833
Lebanon, application for permission to extend water works,	510,516
permit to extend water works,	515
Lee, Benjamin, Assistant to the Commissioner,	3
Lehigh River watershed,	865
Lenhartsville, investigation of sewers,	458
Leprosy, to be reported,	8
case of,	28
in the United States, report of U. S. Commission on,	29,30
Liq. Cresolis Comp. an efficient germicide,	126
germicidal activity of,	99,123
List of distributors of diphtheria antitoxin,	356,363
towns obtaining drinking water from Delaware river,	862
tuberculosis dispensaries,	59
physicians,	59
Little Schuylkill River,	870
Location of tuberculosis dispensaries,	57
Lower Merion township, Montgomery county,	700,702
Lukens, William, case abated,	954
Lymphatic organs affected by tuberculin,	954
McCurdy, Joseph A., Esq., case referred to,	956
McKee, T. N., C. M. I., report on typhoid fever in Armstrong county,	45
McKeesport, application for permission to extend water works,	518
permit to extend water works,	522
Maiden Creek,	870
Maignen, P. A., filter at Kittanning,	898
Maison, Robt. S., C. M. I., report of typhoid fever in Delaware county,	49
Malarial fever, to be reported,	8
Manatawney Creek,	870
Manheim,	919
sanitary conditions,	920
Mann, C. H., Acting C. M. I., report on typhoid fever in Montgomery county,	50
Maps of counties,	466
Maps of watersheds of Allegheny and Monongahela rivers,	466
Marcus Hook, application to install sewers,	705
Marriage statistics,	345
rate per 1,000 of population, table,	350
percentage of age periods, table,	351,352
Marriages, number of,	31,347
by months and counties, table,	348,349
by nativity, table,	351
Marsteller, James L., Esq., case referred to,	956
Martin and Vandremer on wax extraction,	100
Masterton, Lee, member of Advisory Board,	8
Matson, Eugene, bacteriologist of Pittsburg,	897
Matthews, W. E., C. M. I., report of smallpox in Cambria county,	42
care of typhoid epidemic at Spangler,	914
report on typhoid fever in Cambria county,	47
Measles, compared with registration area,	173
mortality,	24
to be reported,	8
German, to be reported,	8
deaths from,	173
Media, sterilization of,	99
Medical Inspection, Division of,	41
Medical Inspectors, County, new appointments,	4,7
Railroad,	4
Inspectors of Dispensaries,	7
Method of removing wax from tubercle bacilli,	100
Mewhinney, J. C., C. M. I., report on typhoid fever in Chester county,	48
Middleburg, examination on application for sewerage,	458
Middletown Drainage Co., examination on applications for sewerage,	458
Military reservation at Mt. Gretna,	851
bacteriological examination of well water,	856
chemical examination of well water,	856

Page.
Milk, examinations of, ... 98
supply at Kittanning, ... 898,899
Miner, Chas. H., C. M. I., report of scarlet fever in Luzerne county,.. 53
Miscellaneous stream pollution, ... 861
Mock Sem, Chinese leper, case of, ... 28
Mont Alto, A. M. Rothrock, Resident Physician at, ... 7
Moore, Jesse D., C. M. I., report on scarlet fever in Lawrence county, 52
Morbidity statistics, ... 4,333
Morris, Casper, Chief Medical Inspector, P. & R. R. R., ... 11
Morse, Wilbur, Secretary to the Commissioner, ... 3
Mortality of Pennsylvania, ... 23,160
Mortality of Pennsylvania compared with other resigtration states, .. 161
Mortality tables, ... 183
Mothers, nativity and number of, table, ... 290,320
Maulton, Arthur B., Assistant Chief Medical Inspector, ... 4
report of case of leprosy, ... 28,29
report of inspection at Franklin and Conemaugh, 926
report of inspection at Ridgway, ... 927
Mt. Gretna, camps healthy, ... 854
location and watershed, ... 822
National Guards at, ... 833
recommendations for sanitary improvement of grounds,.. 858
springs in neighborhood of, polluted, ... 830
sanitary precautions at, ... 23,827
two permanent improvements demanded, ... 855
typhoid fever near, ... 833
water examinations at, ... 859,860
Mt. Penn, investigation of sewers, ... 458
Mumps, to be reported, ... 8
Municipalities on Schuylkill River, ... 869
using filtered river water, ... 869
using unfiltered river water, ... 869
Narberth, application to install sewers, ... 707
permit to install sewers, ... 707
Nativity and numbers of mothers, table, ... 290,320
Nativity, deaths by, ... 248,251
Nativity and ages of mother, table, ... 271,289
Natrona, investigation of sewage, ... 458
Necessity for care in sending specimens of sputum, ... 91
voluminous decrees, ... 956
Nervous system, diseases of, ... 180
New Castle, application to extend sewers, ...708,709,710
permit to extend time, ... 710
New Oxford, permit to install sewers, ... 716,718
Newport, permit to install sewers, ...710,712,716
Newville village, typhoid fever at, ... 833
Not practicable to treat mingled sewage and storm water, ... 565
Notice to Mt. Gretna Camp Meeting Association, ... 844
Pennsylvania Chautauqua Association, ... 838,840
Notices to protect wells and springs, ... 833
Nuisances in streams, investigation of, ... 463
Nurses in tuberculosis dispensaries, ... 55
Oakmont, application to extend sewers, ... 719,723
permit to extend sewers, ... 723
examinations on application for sewerage, ... 458
Occupational mortality of tuberculosis of the lungs, ... 177,178
Office work, tuberculosis dispensaries, ... 55
Operations of the divisions, ... 39
Order for protection of water of Ridgway, ... 533
Scranton, ... 885
Orders of abatement, ... 465
Organization of department, ...10,11,12,13,14,15
Organisms in feces and sewage, the predominating, ... 99
Original use of degreased organisms, ... 100
Osborne, application to modify permit, ...726,728,730
permit to install sewers, ... 730
Palmer, Louis J., Attorney-at-Law, ... 954
Palmerton, Lower Towamensing township, Carbon county, application to install sewers, ... 702,707
Palmerton, Lower Towamensing township, Carbon county, permit to install sewers, ... 705
Pathologic changes from injections of serum extract, ... 112
effect of largest doses of bacillary products, ... 102
Paxtang Consolidated Company, adjustment, ... 955
Pearson, Leonard, member of Advisory Board, ... 8

Page.
Peirson, Henry W., Chief, Division of Antitoxin and Vaccines, ... 5,353
Pennsylvania Chautauqua Association of Mt. Gretna, ... 834
Pennypack Creek drainage district, Phila., application for permission to extend sewers, ... 734,735
permit to extend sewers, ... 735
Penrose, Charles B., member of Advisory Board, ... 8
Perkiomen Creek, ... 870
Philadelphia, Cobb's Creek drainage district, permit to extend sewers, 737,746,747
Frankford Creek drainage district, permit to extend sewers, ... 734,744,745,746
Main Delaware River drainage district, permit to extend sewers, ... 740,744,745,746
Pennypack Creek drainage district, permit to extend sewers, ... 735
Schuylkill River drainage district, permit to extend sewers, ... 743,744,745,747
Phoenix Iron Company, case abated, ... 954
Pitcairn, Ft., permission to extend sewers, ... 747,750
permit to extend sewers, ... 749
Pittsburg, decree for plan for sewage disposal, ... 752
Pneumonia (true), to be reported, ... 8
Polk, State Institution for Feeble-minded, application to install sewers, 753,755
permit to install sewers, ... 735
Pollution of water by tubercle bacillus, ... 99,115
Pollution of Elk Creek, ... 928
Pollutions on Lehigh River watershed, ... 866
Population of Pennsylvania, ... 157
incorporated municipalities exceeding 2,500, ... 158,159,160
Portland, application to install sewers, ... 522
permit to install water works, ... 524
Precautionary measures at tanneries, ... 945
Predominating organisms in feces and sewage, ... 99
Preliminary report on effect of serum on tubercle bacilli, ... 106
predominating microbe organisms in feces, 130
work at South Mountain Sanatorium, ... 811
Presence of B. Coli Communis in intestines of fish, ... 106
Puerperal fever, to be reported, ... 8
Quarantine in scarlet fever, period of, ... 8
absolute, defined, ... 9
modified, defined, ... 9
Railroad Medical Inspectors, list of, ... 11
water supply for passengers and employes, ... 861
Raub, M. W., C. M. I., inspection at Dunkard home, ... 922
Reaction of opsonins of elephants, ... 99,121
Reading, Schuylkill River at, ... 870
Recommendations for improvement of ground at Mt. Gretna, ... 858
Recorded plans to be filed with Commissioner of Health, ... 461
References to special counsel, ... 948
Registration of Marriages, Bureau of, ... 4
Relapsing fever, to be reported, ... 8
Remedies enforced by department to protect water supply of Kittanning, ... 905
Report of Bureau of Vital Statistics, ... 155
Report of dispensaries, tabular, ... 60
Sub-Division of Special Medical Inspection, ... 61
sanitary inspection of schools by counties, ... 63,84
Division of Laboratories and Experiment Station, ... 85
water analyses by counties, ... 96,98
Republican party, action in regard to tuberculosis, ... 6
Research work, ... 99
Reynoldsville, investigation of water works, ... 458
Rice, Geo. C., C. M. I., report on scarlet fever in Adams county, ... 51
smallpox in Adams county, ... 41
Ridgway, application to extend water works, ... 525
typhoid fever epidemic at, ... 927
Ridley Creek, ... 871
Rifle range at Mt. Gretna, ... 835
Rinehart, S. M., C. M. I., report on typhoid fever in Allegheny county, 44
Rivas, Damaso, Bacteriologist to Department, ... 14
differentiation of Bacillus Coli Communis from allied species, ... 143
report on predominating organisms in feces, ... 130
rapid test for indol, ... 133
Riverton Consolidated Company, adjustment, ... 955

Page.
Roaring Brook watershed, improved sanitation work on, ... 888
population, ... 887
Rodmen, Edgar R. Barnes, ... 457
Ivan M. Glace, ... 457
Geo. R. Fox, ... 457
Rothrock, A. M., Resident Physician at Mont Alto, ... 7
Rothrock, J. T., former Forestry Commissioner, ... 19
Rucker, J. B., substitute assistant bacteriologist, ... 89
Rules and regulations as amended by Advisory Board, ... 8
Rush hospital, sewage from, ... 116
St. Marys, application to install sewers, ... 755,758
investigation of water works, ... 458
permit to install sewers, ... 758
Saccharolytic group, ... 150
Saltsburg, application to extend sewers, ... 759,761
Sanitary districts in counties, ... 466
Engineering, Division of, ... 4
districts, ... 460
Legislation of 1907, ...15,16,17,18,19
precautions at Mt. Gretna, ... 23
Sanatoria fund, ... 393
Scalp level, application to install sewers, ... 761,764
permit to install sewers, ... 764
Scarlet fever, period of quarantine, ... 8
to be reported, ... 8
mortality, ... 24
deaths by month, ... 173
in Adams county, ... 51
Bucks county, ... 51
Blair county, ... 52
Clearfield county, ... 52
Columbia county, ... 53
Lawrence county, ... 52
Lehigh county, ... 52
Luzerne county, ... 53
number of cases of, ... 341
by months, table, ... 342
by age periods, table, ... 342
by nativity and age, table, ... 342
by color and age, table, ... 342
by sex and color, table, ... 343
Scarlatina, to be reported, ... 8
Scarlet Rash, to be reported, ... 8
Schools, report of sanitary inspection of, ... 63
by counties, ... 65,84
Schuylkill River drainage district, Phila., permission to extend sewers, 741,743,744,745,747
chemistry of, ... 870,871
watersheds, ... 868
major pollutions, ... 868
Valley Traction Company, case abated, ... 954
Serum extract, pathological changes from, ... 112
on tubercle bacillus, effect of, ... 109
is toxic, ... 114
does not produce immunity, ... 114
Sewage defined, ... 563
disposal at Ridgway, ... 928
Sewerage of East Conemaugh, ... 924
disposal works at Mt. Gretna, ... 837
system at Mt. Gretna, ... 837
and sewage disposal permits and decrees, ... 563
and water works systems in the Delaware River Basin in Pennsylvania, ... 862
Sewers to conform to comprehensive plan, ... 565
Sex and months, deaths by, table, ... 184,193
Sex, deaths by, ... 248,251
Sharon, investigation of sewage, ... 458
water works, ... 458
Shelly, Abram, stream pollution, abatement, ... 955
Shower baths at camps, ... 854
Simpson, E. I., accounting and purchasing agent, ... 15,385
Smallpox in Adams county, ... 41
Allegheny county, ... 41
Bradford county, ... 41
Cambria county, ... 42

	Page.
Smallpox in Chester county,	42
Clarion county,	42
Cumberland county,	43
Dauphin county,	43
Erie county,	43
Franklin county,	43
Lancaster county,	43
Lawrence county,	43
Susquehanna county,	44
Wayne county,	44
Smallpox, to be reported,	8
mortality,	24
Smith, Allen J., Director of Pathology,	5
A. D., communication to,	848,857
President, Cornwall and Lebanon Railroad,	834
Snow, F. Herbert, Chief Engineer,	4,453
address before Engineer's Society of Western Pa.,	37
Source of water supply to railroads,	466
South Bradford, investigation of water works,	458
South Renovo, application to install water works,	538
permit to extend water works,	542
South Sharon, investigation of sewage,	458
Spangler, epidemic of typhoid at,	914
Special counsel, references to,	948
Special field officers,	458
Special engineers, L. E. Chapin,	457
C. F. Drake,	457
Harvey Linton,	457
Chas. F. Mebus,	457
F. H. Shaw,	457
Elton D. Walker,	457
Nathan F. Walker,	457
E. F. Wheelock,	457
Spotted fever (epidemic cerebrospinal meningitis), to be reported,	9
Spring Garden borough, adjustment,	955
Springs at Ridgway,	930,931
State Quarantine Board, Commissioner member of,	6
State Registrar,	13
State Forestry Academy, work of students,	457
State Hospital at Norristown, investigation of sewage disposal,	458
State Hospital at Danville, distribution of sewers and water works,	458
State Hospital at Polk,	458
State Hospital at Warren,	458
State Institution for Feeble-minded, Polk, application to install sewers,	755
permit to install sewers,	755
State South Mountain Sanatorium, bids for construction of sewers,	820
location of,	811
preliminary work on,	811
proposed developments,	814
proposed sewerage systems,	816
proposed sewage disposal works,	821
proposed sewage disposal contract,	824
special construction work	825
Steelton, application to extend water works,	542
permit to extend water supply,	549
Stewart, Adjutant General, tents furnished by,	20
Stites, Thomas H. A., Medical Inspector of Dispensaries,	7
Stoner, Aaron, stream pollution, abated,	955
Streams furnishing Scranton water supply,	886
Study of degreased tubercle bacilli,	99
Study of the Fluid of Dixon,	99
Study of B. Coli from fishes,	99
Study of B. Typhosus and B. Coli Communis in water,	151
Summit Hill, application to install sewers,	767
Susquehanna River, west branch of, drainage,	914
Swatara township, Dauphin county, application to install water works,	534,537
Swatara township, Dauphin county, application to install water works,	537
Water Company, adjustment,	955
Table of Contents,	I,II
Tabular report of dispensaries,	60
Tarentum, investigation of sewage,	458
application to extend water works,	550
permit to extend water works,	554
Taylor, application to extend sewers,	769,772
permit to extend sewers,	772
Technic in examining for tubercle bacillus,	91

Page.
Thomas, Josiah, stream pollution, paid costs, ... 955
Temporary field officers, ... 459
Tents at Mont Alto provided by Adjutant General, ... 20
Tetanus, to be reported, ... 8
Titusville, application to extend sewers, ... 773
permit to extend sewers, ... 773
Towanda, investigation of sources of water supply, ... 458
Town, E. C., Special Medical Inspector, P. R. R., ... 11
Toxicity, comparative of serum extract, etc., ... 108
of dead degreased bacilli, ... 101
virulent living bacilli, ... 101
Tuberculosis of the lungs, deaths from, ... 176
occupational mortality, ... 177
by months, table, ... 343
by age periods, table, ... 343
by nativity and age, table, ... 344
by color and age, table, ... 344
by sex and color, table, ... 344
Tulpehocken Creek, ... 870
Turner, Ira, stream pollution, non-suited, ... 955
Typhoid fever, to be reported, ... 8
mortality, ... 24
in Allegheny county, ... 44,45
Armstrong county, ... 45
Bedford county, ... 45
Bucks county, ... 45
Berks county, ... 46
Bradford county, ... 46,47
Cambria county, ... 47
Chester county, ... 48
Clearfield county, ... 48
Clinton county, ... 48
Columbia county, ... 49
Dauphin county, ... 49
Delaware county, ... 49
Lehigh county, ... 45,50
Montgomery county, ... 50
Northampton county, ... 50
Westmoreland county, ... 51
deaths from, ... 167
by months, ... 169
number of cases, ... 339
by months, table, ... 339
by age periods, table, ... 339
by nativity and age periods, table, ... 340
by color and age periods, table, ... 340
by sex and color, table, ... 340
cases reported by physicians at Scranton, ... 884
epidemic at Burnham, ... 937
in East Conemaugh and Franklin, ... 924
Huntingdon, ... 888
Lewistown, ... 939
Manheim, ... 919
Ridgway, ... 927
Scranton, ... 882
epidemic at Scranton, reported by Chief Engineer, ... 882
Spangler, ... 914
epidemics at Manheim, ... 921
Typhus fever, to be reported, ... 8
Trichiniasis, to be reported, ... 8
Trachoma, to be reported, ... 8
Transit men, Chester A. Egbert, ... 457
C. R. Forbes, ... 457
Tubercle Bacillus, reaction of opsonins of elephant on, ... 99
effect of bile and pancreas on, ... 99
effect of normal serum on, ... 99
effect of in pollution of water, ... 99
study of degreased, ... 99
effect of bile and pancreatic juice on, ... 103
vitality of in sewage, ... 119
Tuberculin, effect of injections in healthy cows, ... 99
Tuberculosis, deaths from, ... 175
dispensaries, plan of, ... 20,55
to be reported, ... 8
mortality, ... 24

Page.
Tuberculosis, Act for the control of, ... 17,18,19
sanatorium at Mont Alto, Act for transfer of, ... 19
dispensaries, nurses, ... 55
location, ... 57
equipment, ... 57
list of, ... 59
list of physicians, ... 59
United Brethren, camp meeting ground, ... 834
United Ice & Coal Company, Harrisburg, notice to, ... 850
Venango Water Company, plans submitted, ... 458
Verona, examinations on application for sewerage, ... 458
application to extend sewers, ... 773,776
permit to extend sewers, ... 776
Versailles, application to install sewers, ... 777
Viability of tubercle and sewage organisms, ... 119
Virulent living bacilli, toxicity of, ... 101
Vital Statistics, report of, ... 155
Wage earners allowed certain privileges during quarantine, ... 9
Walker, Professor, examination for sewerage, ... 458
Wall, examinations on application for sewerage, ... 458
application to install sewers, ... 779
permit to install sewers, ... 781
Wagner, Norton, stream pollution, abated, ... 955
Warning against pollution of Scranton water supply, ... 886
Warren, B. H., member of Advisory Board, ... 8
Warren, application to extend sewers, ... 781
water works, ... 555
Washington, application to extend sewers, ... 788,794
permit to extend sewers, ... 794
township, Franklin county, application to install water works, ... 561
township, Franklin county, permit to install water works, ... 562
Water Company, Armstrong, ... 895
Barnesboro, ... 915
Bethlehem City, ... 866
Clear Spring, ... 866
Conemaugh and Franklin, ... 895
Citizens at Kittanning, ... 895
Lewistown, ... 938
Manheim, ... 920
Rayburn-Wickboro, ... 895
Reedsville, ... 938
St. Benedict, ... 915
Spangler, ... 915
Springfield, ... 872
Water analysis, card for bacteriological, ... 94
analyses at Kittanning, ... 906,907,908,909,910,911,912,913
examinations at Mt. Gretna, ... 859,860
sample collection, ... 880,881,934
Water Supply Commission, Commissioner member of, ... 6
of rifle range, ... 835
works applications, ... 468
permits and decrees, ... 469
of Ridgway, ... 929
Watershed, Allegheny, inspection of public institution on, ... 880
East Conemaugh, ... 925
Manheim, ... 920
of Beaver, Spangler, Perkiomen Creek, Tacoma Creek, Gulf Creek, ... 917
of Conodoguinet Creek, Conococheague Creek, Crum Creek, ... 456
of Conestoga Basin, Shenango River, Maiden Creek, Penn's Creek, Codorus Creek, ... 467
of Chambersburg, Carlisle, Huntingdon, E. Mauch Chunk, Spangler, Catasauqua, Coatesville, Middletown, Manheim, ... 877
of Johnstown, Lancaster, Reading, Philadelphia, Scranton, Wilkes-Barre, ... 876
sanitary survey of, ... 880
Watson, R. B., C. M. I., report on typhoid fever in Clinton county, .. 48
Watsontown, examinations on application for sewerage, ... 458
Weather conditions during Scranton epidemic, ... 888
Weiss, Edward, stream pollution, held in bail, ... 955
Welsh, William M., diagnosis of case of leprosy, ... 28

Page.
West Conshohocken, investigation of water works, ... 458
West Leesport, investigation of sewers, ... 458
West Reading, investigation of sewers, ... 458
Wheelock, D. F. A., investigation of anthrax at Corry, ... 941
Whitcomb, H. H., C. M. I., report of typhoid fever in Montgomery county, ... 50
White Hall, experiment station, ... 5
White Haven Sanatorium, sewage from, ... 116
Whoopingcough, to be reported, ... 8
mortality, ... 25
deaths from, ... 174
in Pennsylvania compared with registration area, .. 174
deaths from, by sex and age periods, ... 175
by months, ... 175
Wilkes-Barre dispensary opened, ... 21
Williamsport, application to extend sewers, ... 795,797
permit to extend sewers, ... 797
application to construct sewer outlet, ... 797
Witherell, Fred W., investigation at Kittanning, ... 894
Womelsdorf, investigation of sewers, ... 458
Woodburn, S. M., C. M. I., report on smallpox in Bradford county,... 41
typhoid fever in Bradford county, ... 46
Wyoming, application to install sewers, ... 799
Wyomissing, investigation of sewers, ... 458
Yellow fever, to be reported, ... 8
York, permit to install sewers, ... 806
Yorkville, application to extend sewers, ... 807,809
permit to install sewers, ... 809
Zulick, Thomas C., C. M. I., report of typhoid fever in Northampton county, ... 50

THE LIBRARY OF THE
JAN 15 1931
UNIVERSITY OF ILLINOIS.

UNIVERSITY OF ILLINOIS-URBANA
3 0112 119596804